# STOCKPILE AND ACCESSIBILITY OF STRATEGIC AND CRITICAL MATERIALS TO THE UNITED STATES IN TIME OF WAR

# HEARINGS

BEFORE THE

## SPECIAL SUBCOMMITTEE ON MINERALS, MATERIALS, AND FUELS ECONOMICS

OF THE

## COMMITTEE ON INTERIOR AND INSULAR AFFAIRS UNITED STATES SENATE

EIGHTY-THIRD CONGRESS

FIRST AND SECOND SESSIONS

PURSUANT TO

## S. Res. 143

A RESOLUTION TO INVESTIGATE THE ACCESSIBILITY AND AVAILABILITY OF SUPPLIES OF CRITICAL RAW MATERIALS

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PART 9

URANIUM

SALT LAKE CITY, UTAH, NOVEMBER 12, 13, 1953, AND FEBRUARY 26, 1954

COLUMBIUM, COBALT, AND RUTILE

WASHINGTON, D. C., FEBRUARY 26, 1954

MISCELLANEOUS STRATEGIC RAW MATERIALS OF AGRICULTURAL ORIGIN

WASHINGTON, D. C., MARCH 15, 1954

Printed for the use of the Committee on Interior and Insular Affairs

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# STOCKPILE AND ACCESSIBILITY OF STRATEGIC AND CRITICAL MATERIALS TO THE UNITED STATES IN TIME OF WAR

## Uranium

**THURSDAY, NOVEMBER 12, 1953**

UNITED STATES SENATE,
SPECIAL SUBCOMMITTEE ON MINERALS,
MATERIALS, AND FUELS ECONOMICS OF THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Salt Lake City, Utah.*

The subcommittee met at 10 a. m. pursuant to notice, in room 238, United States Federal Building, Salt Lake City, Utah, Senator George W. Malone (chairman) presiding.

Present: Senator James Murray, member of the subcommiteee; Jerome Adlerman, chief counsel for the subcommittee; George Holderer, staff engineer of the subcommittee.

The CHAIRMAN. The subcommittee will be in order.

Let the record show that Senator James Murray of Montana of the subcommittee is present. The other members of the subcommittee are Senator Eugene Millikin of Colorado, Frank Barrett of Wyoming, and Earl Clements of Kentucky. Senator Millikin, I believe is in Europe, and Senators Barrett and Clements have other commitments which prevented their attendance today.

Also let the record show that Senator Bennett of Utah is here and will attend the hearings to the extent that his commitments will allow.

We have notified and have received acknowledgments from the Governor of Utah, J. Bracken Lee who said he would attend if it were at all possible. Dan Thornton, Governor of Colorado; Howard Pyle, Governor of Arizona; and Edwin Mechem, Governor of New Mexico. Also the Senators from those States, Carl Hayden, Barry M. Goldwater of Arizona; Edwin Carl Johnson, and Eugene D. Millikin, who is a member of this committee, from Colorado; Senators Dennis Chavez and Clinton P. Anderson of New Mexico; and both Arthur V. Watkins and Wallace F. Bennett of Utah.

Those Senators and Governors have been notified, because there either has been production or prospecting, or there has been shown extreme interest in the production of uranium materials in their States.

This subcommittee, a subcommittee of the Senate Interior and Insular Affairs Committee, is the Minerals, Materials, and Fuels Economic Subcommittee. Senator Butler of Nebraska is the chairman of the Senate Committee on Interior and Insular Affairs. He has sent word that he would have attended if it were at all possible, but on account of prior commitments he cannot be here today and tomorrow.

You will remember, those of you who appeared in Washington before this Subcommittee on Materials, Minerals, and Fuels in the interests of a modification of the 1920 Oil and Gas Leasing Act, coordinating the 1920 Oil and Gas Leasing Act with the 1872 Mining Act, in order to allow the locators of the uranium material on oil and gas leases up to a certain date to continue their work in the prospecting for and mining of atomic energy material, the uranium material, without undue interference, with the production and the prospecting for production of oil and gas on the leases under the 1920 act, there was passed Public Law 250, of the 83d Congress, chapter 405, 1st session, and it was Senate bill 1397.

I will offer for the record, to appear in the record at this point, Senate Resolution 143, which briefly directs the Senate Committee on Interior and Insular Affairs, or any duly authorized committee thereof, to make a full and complete investigation and study of critical materials.

[S. Res. 143, 83d Cong., 1st sess.]

RESOLUTION

*Resolved*, That the Senate Committee on Interior and Insular Affairs, or any duly authorized subcommittee thereof, is authorized and directed—

(1) to make a full and complete investigation and study of the accessibility of critical raw materials to the United States during a time of war;

(2) to study and recommend methods of encouraging developments to assure the availability of supplies of such critical raw materials adequate for the expanding economy and the security of the United States.

The CHAIRMAN. I believe, speaking as chairman of the committee, and I am sure Senator Murray joins me in this statement, that the first action of this committee in preparing and submitting to the parent committee, Interior and Insular Affairs Committee, and to the Senate floor a modification of the 1920 Oil and Gas Leasing Act coordinating the 1920 act with the 1872 Mining Act to allow prospecting and mining of the uranium materials, was a step in the direction later authorized by the Senate Resolution 143, and I offer at this time, to be made a part of the record, Public Law 250 of the 83d Congress.

PUBLIC LAW 250—83D CONGRESS

CHAPTER 405—1ST SESSION

S. 1397

AN ACT Relating to mining claims located on land with respect to which a permit or lease has been issued, or an application or offer for permit or lease has been made, under the mineral leasing laws, or known to be valuable for minerals subject to disposition under the mineral leasing laws, and for other purposes

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.* That: (a) subject to the provisions of this Act and to any valid intervening rights acquired under laws of the United States, any mining claim located under the mining laws of the United States subsequent to July 31, 1939, and prior to January 1, 1953, on lands of the United States which were, at the time of such location—

(1) included in a permit or lease issued under the mineral leasing laws; or

(2) covered by an application or offer for a permit or lease which had been filed under the mineral leasing laws: or

(3) known to be valuable for minerals subject to disposition under the mineral leasing laws:

shall be effective to the same extent as if such mining claim had been located on lands which were at the time of such location subject to location under the mining laws of the United States: *Provided, however,* That in order to obtain the benefits of this Act, the owner of any such mining claim shall, not later than one hundred and twenty days after the date of enactment of this Act, post on such claim in the manner required for posting notice of location of mining claims and file for record in the office where the notice or certificate of location of such claim is of record an amended notice of location of such claim, stating that such notice is filed pursuant to the provisions of this Act and for the purpose of obtaining the benefits thereof.

(b) Labor performed or improvements made upon or for the benefit of such mining claims after the original location thereof shall be recognized as applicable thereto for all purposes to the same extent as labor performed and improvements made upon or for the benefit of mining claims which are not affected by this Act.

(c) Any withdrawal or reservation made after the original location of such mining claim affecting land covered by such mining claim is hereby modified and amended so that the effect thereof upon such mining claim shall be the same as if such mining claim had been located upon lands of the United States, which, subsequent to July 31, 1939, and prior to the date of such withdrawal, were subject to location under the mining laws of the United States.

SEC. 2. Any mining claim given force and effect as provided in section 1 of this Act shall be subject to the reservation to the United States of all minerals which, upon the effective date of this Act, are provided in the mineral leasing laws to be disposed of thereunder, and the right of the United States, its lessees, permittees, and licensees, to enter upon the land covered by such mining claim to prospect for, mine, treat, store, and remove such minerals, and to use so much of the surface and subsurface of such mining claim as may be necessary for such purposes, and to enter upon such land whenever reasonably necessary for the purpose of prospecting for, mining, treating, storing, and removing such minerals on and from other lands of the United States; and any patent issued for any such mining claim shall contain such reservation.

SEC. 3. The rights under any mining claim given force and effect by this Act shall also be subject to the reservation to the United States specified in section 5 (b) (7) of the Atomic Energy Act of 1946, as amended, and, in addition, any reservation or reservations required by any other provisions or provisions of law; and any patent issued for such mining claim shall contain such reservation.

SEC. 4. Except as this Act provides for (a) validation of certaining mining claims located on lands described in section 1 of this Act, and (b) the modification and amendment of certain withdrawals or reservations of land, nothing in this Act shall affect any power or authority duly vested in the Atomic Energy Commission or any other agency, department, or officer of the United States to make leases, withdrawals, reservations, or other arrangements with respect to source materials as defined in section 5 (b) (1) of the Atomic Energy Act of 1946, as amended.

SEC. 5. As used in this Act "mineral leasing laws" shall mean the Act of October 20, 1914 (38 Stat. 741); the Act of February 25, 1920 (41 Stat. 437); the Act of April 17, 1926 (44 Stat. 301); the Act of February 7, 1927 (44 Stat. 1057) and all Acts heretofore or hereafter enacted which are amendatory of or supplementary to any of the foregoing Acts.

Approved August 12, 1953.

The CHAIRMAN. Resolution 143 covers the investigation of approximately 77 minerals, materials, and fuels which are classed as strategic or critical, and uranium ore is one of the minerals.

I offer at this time for the record, to be made a part of the record at this point, the current list of the strategic and critical materials for stockpiling.

## CURRENT LIST OF STRATEGIC AND CRITICAL MATERIALS FOR STOCKPILING

### GROUP I

### ACQUIRED BY PURCHASE

Abrasive crude aluminum oxide
Aluminum
Antimony
Asbestos, amosite
Asbestos, chrysotile
Asbestos, crocidolite
Bauxite, metal grade
Bauxite, refractory grade
Beryl
Bismuth
Cadmium
Celestite
Chromite, chemical grade
Chromite, metallurgical grade
Chromite, refractory grade
Cobalt
Columbite
Copper
Corundum
Diamonds, industrial
Fluorspar, acid grade
Fluorspar, metallurgical grade
Graphite, amorphous lump
Graphite, crucible grade
Graphite, lubricant and packing grade
Kyanite
Lead
Magnesium
Manganese ore, battery grade
Manganese ore, chemical grade
Managanese ore, metallurgical grade
Mercury
Mica, muscovite block, good stained and better
Mica, muscovite block, stained (radio tube quality)
Mica, muscovite film
Mica muscovite splittings
Mica, phlogopite splittings
Molybdenum
Nickel
Platinum group metals, iridium
Platinum group metals, platinum
Quartz crystals
Rare earths
Selenium
Tin
Titanium
Tungsten
Vanadium
Zinc
Uranium
Thorium

#### Nonminerals

Bristles, hog
Castor oil
Coconut oil
Cordage fibers, abaca
Cordage fibers, sisal
Cotton, extra long staple
Feathers and down, waterfowl
Hyoscine
Iodine
Jewel bearings, instrument jewel except vee jewels
Jewel bearings, sapphire and ruby vee jewels
Jewel bearings, watch and timekeeping device jewels
Opium
Palm oil
Pyrethrum
Quinidine
Quinine
Rubber, crude natural
Sapphire and ruby
Shellac
Silk
Sperm oil
Talc, steatite, block
Vegetable tannin extract, chestnut
Vegetable tannin extract, quebracho
Vegetable tannin extract, wattle

### GROUP II

### ACQUIRED BY TRANSFER OF SURPLUSES

#### Minerals

Bauxite, abrasive
Cryolite, natural
Graphite, crystalline fines
Mica, muscovite block, stained and lower
Ilmenite
Mica, phlogopite block
Platinum group metals, osmium
Platinum group metals, palladium
Platinum group metals, rhodium
Platinum group metals, ruthenium
Rutile
Selenium
Zirconium ore, baddeleyite
Zirconium ore, zircon

Nonminerals

| | |
|---|---|
| Agar | Optical glass |
| Cotton | Talc, steatite, ground |
| Diamond dies | Wool |
| Emetine | |

The CHAIRMAN. This committee has already heard the testimony of the Bureau of Mines engineers. The committee had its first hearings in Seattle because of the congregation of many leading producers and engineers in various fields at the American Mining Congress Convention as I felt it would save time and money hearing them there rather than requiring them to make a trip later.

It was followed by hearings in Washington where we not only heard the producers of many minerals and materials on this list of 77, but we also heard the Bureau of Mines' engineers. As you know, the Bureau has divided its work into particular areas of minerals, and we heard each one of these engineers who have spent many years of their lives in each particular field. They are not interested in any arguments pro and con. They are simply interested in facts.

At the invitation of the committee, they first, after study and work coordinated their information and submitted a list to this committee, giving our mineral position, actual, impending and potential, in the United States and in the Western Hemisphere, because the Senate resolution said that the committee should determine the availability of these minerals, materials and fuels to this Nation in time of war. And no one, perhaps even the Secretary of National Defense, knows which materials will be available in time of war.

But those of us that have been in one or more of these wars know that they are getting progressively tougher, and many military strategists doubt we will be able to secure the materials from areas across one or both major oceans, in time of an all-out world war, when we probably will get beyond the point of selective weapons and selective operations.

In sitting with this War Production Board throughout the war, I was aware that German submarines were sinking about 80 to 90 percent of the shipments of chromite and manganese from South Africa, and if we had not whipped that submarine menace about when we did, we would have lost World War II. All those records and histories are behind this resolution 143.

In this list for the United States as to mineral positions, actual and impending, self-sufficient and virtual self-sufficiency assured for a long time. It is a list that I will not read. I will offer it for the record.

Military strategists seem to agree that we could defend the lines of transportation in the Western Hemisphere.

If the laboratory work and technologic and economic changes are followed by a practical program, in the opinion of the Engineers and the Bureau of Mines, only in industrial diamonds would the Western Hemisphere be unable to become self-sufficient in a 3- to 5-year program. We also had expert testimony that the use of industrial diamonds could be decreased approximately 50 percent through the use of other known methods in doing their work, and also that there are probably undeveloped sources of industrial diamonds in South America.

All of this detailed information was made available at the hearings, and I offer at this time, as a part of the record, the list on our mineral positions, actual, impending and potential, of the United States and the Western Hemisphere.

ATOMIC ENERGY ACT

The CHAIRMAN. The Atomic Energy Act made and established special conditions to meet the production of atomic materials. We intend to hear Mr. Johnson, manager of production, Atomic Energy Commission, at which time we will include in the record the pertinent parts of the Atomic Energy Act and the conditions under which this material is being purchased, milled, and stockpiled.

It was not the intention of the committee to ask for or accept any classified information at this hearing. If it becomes necessary to obtain classified information in order to understand some of the problems and programs, this informantion will be handled at an executive session right in Washington.

Now the special committee, the Subcommittee on Materials, Minerals and Fuels, is directed to report in January to the Interior and Insular Affairs Committee, the parent committee. That committee then will consider the report for submission to the Senate.

In setting up this hearing, first I want it understood that we are working very closely with the Atomic Energy Commission. I have the highest regard for the chairman, Mr. Strauss, and all of the members of the committee with whom I have come in contact, and I am sure I am speaking for the entire committee, and the subcommittee also, and for the technical men, like Mr. Johnson, who are here. They had a job to do. This was a new field.

Some of you may remember that in 1944 we published an industrial encyclopedia of the 11 Western States. We had some idea then that we could become self-sufficient, our economy and our national defense could be strengthened. Ability to develop ourselves could be strengthened by the increased production of the materials in this country and also in the Western Hemisphere. We brought out much valuable information. It is still considered one of the best industrial encyclopedias available, although it is 10 years old.

But in that report we covered the known production of uranium at that time, and also the areas where it probably could be produced, and we covered the plateaus of Utah and Colorado, and the methods of producing this ore and some of its uses, which everyone knew would be greatly expanded if they were able to split the atom, which they did, and you all know and you are familiar with the progress since that time.

But I want to point out to any critics of the Atomic Energy Commission that Congress had to establish somebody to manage this important area of production since little was known about it. Little was known about its ultimate use and little was known about its occurrences and how it could be produced advantageously, and above all it seemed at that time, during a war that it must be kept very secret. It was thought at that time that its uses and potential uses should be secret.

(Based on "commercial" reserves, outlook for noteworthy discovery, and

## UNITED STATES

### ACTUAL AND POTENTIAL

(Based on present technologic and economic conditions and on "commercial" reserves)

A. VIRTUAL SELF-SUFFICIENCY ASSURED FOR A LONG TIME:

Anthracite
Bituminous coal and lignite
Helium
Natural gas
Petroleum

Arsenic
Gallium
Indium
Magnesium
Molybdenum
Tellurium
Thallium
Titanium (ilmenite)
Zirconium

Boron minerals
Bromine
Lithium (spodumene)
Nitrates
Phosphate rock
Potash
Salt
Steatite talc (for grinding)
Sulfur

B. COMPLETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

1. Small or remote expectation of improving position through discovery:

Beryllium
Chromite
Manganese
Nickel
Platinum metals
Tin

Asbestos
Corundum
Diamonds (industrial)
Graphite (strategic)
Jewel bearings
Kyanite (strategic)
Mica (strategic)
Quartz crystal (radio grade)
Steatite talc (block)

2. Good expectation of improving position through discovery:

Columbium-Tantalum
Strontium minerals

3. Good expectation of improving position through synthesis:

Corundum
Kyanite (strategic)
Mica (strategic)
Quartz crystal (radio grade)
Steatite talc (block)

C. PARTIAL DEPENDENCE ON FOREIGN SOURCES, ACTUAL OR IMPENDING:

1. Good expectation of improving position through discovery:

Cadmium
Cobalt
Copper
Germanium
Gold
Iron ore
Lead
Mercury
Rare earth metals
Selenium
Silver
Tungsten
Zinc

Barite
Fluorspar
Iodine

2. Little hope of improving position through discovery:

Aluminum ore
Antimony
Bismuth
Cesium-Rubidium
Titanium (rutile)

### POTENTIAL

(If technologic and economic changes permit use of known submarginal resources)

A. VIRTUAL SELF-SUFFICIENCY:

Anthracite
Bituminous coal and lignite
Helium
Natural gas
Petroleum

Aluminum ores
Arsenic
Beryllium
Gallium
Germanium
Indium
Iron ore
Magnesium
Manganese
Molybdenum
Rare earth metals
Selenium
Tellurium
Thallium
Titanium (ilmenite)
Titanium (rutile)
Zirconium

Barite
Boron minerals
Bromine
Corundum
Graphite (strategic)
Iodine
Jewel bearings
Kyanite (strategic)
Lithium (spodumene)
Nitrates
Phosphate rock
Potash
Quartz crystal (radio grade)
Salt
Steatite talc (for grinding)
Steatite talc (block)
Strontium minerals
Sulfur

B. COMPLETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

Nickel
Platinum metals
Tin

Asbestos
Diamonds (industrial)

C. PARTIAL DEPENDENCE ON FOREIGN SOURCES:

Antimony
Bismuth
Cadmium
Cesium-Rubidium
Chromite
Cobalt
Columbium-Tantalum
Copper
Gold
Lead
Mercury
Silver
Tungsten
Zinc

Fluorspar
Mica (strategic)

### ACTUAL AND POT

(Based on present technolo
ditions and on "commercial" re

A. VIRTUAL SELF-SUFFICIENCY AS

Anthracite
Bituminous coal and lignite
Helium
Natural gas
Petroleum

Arsenic
Cadmium
Gallium
Gold
Indium
Lead
Magnesium
Molybdenum
Nickel
Selenium
Silver
Tellurium
Thallium
Titanium (ilmenit
Zinc
Zirconium

B. COMPLETE OR VIRTUAL DEPEN

1. Small or remote expectati
through discovery:

Beryllium
Chromite
Manganese
Tin

2. Good expectation of impro
discovery:

Columbium-

3. Good expectation of impro
synthesis:

C. PARTIAL DEPENDENCE ON FOR
IMPENDING:

1. Good expectation of impro
discovery:

Antimony
Bismuth
Cobalt
Copper
Germanium
Iron ore
Mercury
Platinum
Rare earth
Tungsten

2. Little hope of improving

Aluminum
Cesium-Rub
Titanium

MINERAL POSITION—ACTUAL, POTENTIAL, AND POTENTIAL

discovery, and the possibility that known submarginal resources can be made available by technologic progress and improved economic conditions)

RELATIVE SELF-SUFFICIENCY

UNITED STATES, CANADA AND MEXICO

ACTUAL AND POTENTIAL

(Based on present technologic and economic conditions and on "commercial" reserves)

A. VIRTUAL SELF-SUFFICIENCY ASSURED FOR A LONG TIME:

Arsenic
Cadmium
Gallium
Gold
Iodine
Lead
Magnesium
Molybdenum
Nickel
Selenium
Silver
Tellurium
Thallium
Titanium (ilmenite)
Zinc
Zirconium

Barite
Boron minerals
Bromine
Lithium (spodumene)
Nitrates
Phosphate rock
Potash
Salt
Steatite talc (for grinding)
Sulfur

B. COMPLETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

1. Small or remote expectation of improving position through discovery:

Beryllium
Chromite
Manganese
Tin

Corundum
Diamonds (industrial)
Graphite (strategic)
Jewel bearings
Kyanite (strategic)
Mica (strategic)
Quartz crystal (radio grade)
Steatite talc (block)

tion of improving position through

Columbium-Tantalum

tion of improving position through

Corundum
Kyanite (strategic)
Mica (strategic)
Quartz crystal (radio grade)
Steatite talc (block)

DENCE IN FOREIGN SOURCES, ACTUAL OR

C. PARTIAL DEPENDENCE ON FOREIGN SOURCES:

tion of improving position through

Antimony
Bismuth
Cobalt
Copper
Germanium
Iron ore
Mercury
Platinum metals
Rare earth metals
Tungsten

Asbestos
Fluorspar
Iodine
Strontium minerals

of improving position through discovery:

Aluminum ore
Cesium-Rubidium
Titanium (rutile)

POTENTIAL

(If technologic and economic changes permit use of known submarginal resources)

A. VIRTUAL SELF-SUFFICIENCY:

Anthracite
Bituminous coal and lignite
Helium
Natural gas
Petroleum

Aluminum ores
Antimony
Arsenic
Beryllium
Cadmium
Copper
Gallium
Germanium
Gold
Iodine
Iron ore
Lead
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Rare earth metals
Selenium
Silver
Tellurium
Thallium
Titanium (ilmenite)
Titanium (rutile)
Zinc
Zirconium

Barite
Boron minerals
Bromine
Corundum
Fluorspar
Graphite (strategic)
Iodine
Jewel bearings
Kyanite (strategic)
Lithium (spodumene)
Nitrates
Phosphate rock
Potash
Quartz crystal (radio grade)
Salt
Steatite talc (for grinding)
Steatite talc (block)
Strontium minerals
Sulfur

B. COMPLETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

Tin

Diamonds (industrial)

C. PARTIAL DEPENDENCE ON FOREIGN SOURCES:

Bismuth
Cesium-Rubidium
Chromite
Cobalt
Columbium-Tantalum
Platinum metals
Tungsten

Asbestos
Mica (strategic)

WESTERN HEM

ACTUAL AND POTENTIAL

(Based on present technologic and economic conditions and on "commercial" reserves)

A. VIRTUAL SELF-SUFFICIENCY ASSURED FOR A LONG TIME:

Anthracite
Bituminous coal and lignite
Helium
Natural gas
Petroleum

Aluminum ores
Antimony
Arsenic
Beryllium
Bismuth
Cadmium
Copper
Gallium
Gold
Iodine
Iron ore
Lead
Magnesium
Molybdenum
Nickel
Platinum metals
Rare earth metals
Selenium
Silver
Tellurium
Thallium
Titanium (ilmenite)
Zinc
Zirconium

Barite
Boron minerals
Bromine
Lithium (spodumene)
Nitrates
Phosphate rock
Potash
Quartz crystal (radio grade)
Salt
Steatite talc (for grinding)
Sulfur

B. COMPLETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

1. Small or remote expectation of improving position through discovery:

Chromite

Corundum
Diamonds (industrial)
Graphite (strategic)
Jewel bearings
Kyanite (strategic)
Steatite talc (block)

2. Good expectation of improving position through discovery:

3. Good expectation of improving position through synthesis:

Corundum
Kyanite (strategic)
Steatite talc (block)

C. PARTIAL DEPENDENCE ON FOREIGN SOURCES, ACTUAL OR POTENTIAL:

1. Good expectation of improving position through discovery:

Cesium-Rubidium
Cobalt
Columbium-Tantalum
Germanium
Manganese
Mercury
Tin
Titanium (rutile)
Tungsten

Asbestos
Fluorspar
Iodine
Mica (strategic)
Strontium minerals

d improved economic conditions)

MINERAL RESOURCES

ACTUAL AND POTENTIAL

d on present technologic and economic con-
d on "commercial" reserves)

AL SELF-SUFFICIENCY ASSURED FOR A LONG TIME:

| | | |
|---|---|---|
| e | Aluminum ores | Barite |
| s coal | Antimony | Boron minerals |
| nite | Arsenic | Bromine |
| as | Beryllium | Lithium (spodumene) |
| | Bismuth | Nitrates |
| | Cadmium | Phosphate rock |
| | Copper | Potash |
| | Gallium | Quartz crystal (radio grade) |
| | Gold | Salt |
| | Indium | Steatite talc (for grinding) |
| | Iron ore | Sulfur |
| | Lead | |
| | Magnesium | |
| | Molybdenum | |
| | Nickel | |
| | Platinum metals | |
| | Rare earth metals | |
| | Selenium | |
| | Silver | |
| | Tellurium | |
| | Thallium | |
| | Titanium (ilmenite) | |
| | Zinc | |
| | Zirconium | |

ETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

l or remote expectation of improving position
iscovery:

| | |
|---|---|
| Chromite | Corundum |
| | Diamonds (industrial) |
| | Graphite (strategic) |
| | Jewel bearings |
| | Kyanite (strategic) |
| | Steatite talc (block) |

expectation of improving position through
:

expectation of improving position through
:

| |
|---|
| Corundum |
| Kyanite (strategic) |
| Steatite talc (block) |

AL DEPENDENCE ON FOREIGN SOURCES, ACTUAL OR
DING:

expectation of improving position through
:

| | |
|---|---|
| Cesium-Rubidium | Asbestos |
| Cobalt | Fluorspar |
| Columbium-Tantalum | Iodine |
| Germanium | Mica (strategic) |
| Manganese | Strontium minerals |
| Mercury | |
| Tin | |
| Titanium (rutile) | |
| Tungsten | |

POTENTIAL

(If technologic and economic changes permit use of known submarginal resources)

A. VIRTUAL SELF-SUFFICIENCY:

| | | |
|---|---|---|
| Anthracite | Aluminum ores | Barite |
| Bituminous coal and lignite | Antimony | Boron minerals |
| Helium | Arsenic | Bromine |
| Natural gas | Beryllium | Corundum |
| Petroleum | Bismuth | Fluorspar |
| | Cadmium | Graphite (strategic) |
| | Cesium-Rubidium | Iodine |
| | Copper | Jewel bearings |
| | Gallium | Kyanite (strategic) |
| | Germanium | Lithium (spodumene) |
| | Gold | Mica (strategic) |
| | Indium | Nitrates |
| | Iron ore | Phosphate rock |
| | Lead | Potash |
| | Magnesium | Quartz crystal (radio grade) |
| | Manganese | Salt |
| | Mercury | Steatite talc (for grinding) |
| | Molybdenum | Steatite talc (block) |
| | Nickel | Strontium minerals |
| | Platinum metals | Sulfur |
| | Rare earth metals | |
| | Selenium | |
| | Silver | |
| | Tellurium | |
| | Thallium | |
| | Titanium (ilmenite) | |
| | Titanium (rutile) | |
| | Zinc | |
| | Zirconium | |

B. COMPLETE OR VIRTUAL DEPENDENCE ON FOREIGN SOURCES:

| |
|---|
| Diamonds (industrial) |

C. PARTIAL DEPENDENCE ON FOREIGN SOURCES:

| | |
|---|---|
| Chromite | Asbestos |
| Cobalt | |
| Columbium-Tantalum | |
| Tin | |
| Tungsten | |

Prepared by the Bureau of Mines
Washington, D. C.
October 15, 1953

Therefore, Congress did the best thing it knew to do. It established this special committee. If you review the history of Congress, Congress established a special committee or bureau and later it becomes less necessary to handle the material in the manner originally set up, and once in awhile even a bureau or a commission reaches into some other branch of the Government, a permanent branch of the Government, or is abolished. I will admit that not very many of them have been abolished. I am not advocating anything at all here about any agency of the Government. I am merely pointing out to any possible critics of the AEC that it has done the best job it knew how to do, and in my humble opinion up to now, it has done a good job.

Now, what we do from here on is up to Congress and the President of the United States, and we are here, as I said before at the opening, to determine how our new legislation is working out, and then under Resolution 143 to determine, as much as we can, without disclosing any classified information, where we are going with the production in this country, and in the Western Hemisphere, if the proper encouragement is being offered, or what we could do if it were offered.

Senator Murray, do you have any statement you would like to make?

Senator MURRAY. No, Mr. Chairman, I think you have covered the situation or program which we are engaged in so thoroughly that I don't think I could add anything to it.

The CHAIRMAN. Thank you, Senator.

Now we depended and leaned heavily on the mining associations to help us in setting up this hearing, principally because they are the leaders in our respective States, and they are the collectors of information, and render whatever assistance they can at all times.

I have been familiar with both of these associations over a period of many years, and in my opinion they have done a good job. Under special situations and special occasions we are all interested. At the first meeting everybody is always enthusiastic, and then after you get down to the drudgery of work, you can either finish it yourself or let it go. The mining associations continue on and on, and they really do a good job in their respective fields.

Miles Romney, Bob Fullmer, and Haldane, all three asked to be here, and to offer whatever testimony and offer whatever procedure they may believe that the committee should follow. As a matter of fact we are leaning on them a little beyond the facts. We are leaning on them for advice, too. So at this time we will call Miles Romney. We are in his home town, and we know he has kept in close touch with the mining and prospecting of this important material.

Mr. Romney, would you identify yourself for the record. If you have a prepared statement you can either read it or quote from it, and offer it for the record in any way you see fit.

## STATEMENT OF MILES P. ROMNEY, MANAGER, UTAH MINING ASSOCIATION

Mr. ROMNEY. Chairman Malone and Senator Murray, my name is Miles P. Romney. I am manager of the Utah Mining Association. I have a brief prepared statement here that I would like to read. I

would like to comment briefly before I begin reading that paper. I appreciate very much the opportunity to appear here today. I appeared before your committee just a few weeks ago in Washington, D. C., on the lead-zinc situation, which was thoroughly discussed and reviewed by your committee at that time, along with a number of other minerals that are critical to our defense effort.

Chairman MALONE. Yes, Mr. Romney, I want to say at this time we have had certain inquiries. We are out here in an area where many of these minerals and materials are produced, but we do not intend to go into anything except the production of uranium materials, for the very simple reason we have covered the other materials, and I think we have laid the groundwork so that we can secure the information we need. If any additional information is necessary we will get it.

How long have you been in this business of managing an association of miners?

Mr. ROMNEY. Well, I am a relative newcomer in that field, Senator. It has been just about 2 years since I came with the Utah Mining Association.

Chairman MALONE. It is an old association?

Mr. ROMNEY. It is an old association. I can't give you the exact date, but going through the files, I find records of activities for a long time.

The CHAIRMAN. You do know you are dealing with a pretty tough bunch of men.

Mr. ROMNEY. Are you speaking of my boys or me?

The CHAIRMAN. I am speaking of the prospectors and miners.

Mr. ROMNEY. That is right.

The CHAIRMAN. How do you get along with them?

Mr. ROMNEY. That has been one of the most pleasant experiences of my life. On coming to work for the United States Smelting Co. back in 1936, my job was with the prospectors. I spent some 15 years in the field, in looking at properties and trying to be of help and giving them advice wherever I could, and I think I have met and worked with about as many prospectors as anyone else in the field.

The CHAIRMAN. You are a mining engineer?

Mr. ROMNEY. I am a graduate geologist.

The CHAIRMAN. Go ahead.

Mr. ROMNEY. My comments are directed to the general field and particularly relate to the exploration field, so that I will read the paper just directed to that line:

> There is an old axiom in the mining industry to the effect that if the need exists and the price is right, the metals will be found. In applying this to uranium, I do not pretend to pass judgment on the fairness of present uranium prices, bonuses, and allowances, but it is apparent that compensation for the material on a guaranteed minimum basis, has stimulated tremendous exploration activities. One pertinent feature in prices, bonuses, and allowances is that they have been assured through a period long enough to permit fairly long range planning by the individual or company interested in exploration. In other words, stability added materially to the incentive of price.
>
> To the above axiom might be properly added that right price assumes such reasonable time factor in price stability as to cover exploration, development, and mining of the minerals.

The CHAIRMAN. Right at that point, did you ever hear of any material that was profitable to mine that somebody didn't find some place finally?

Mr. ROMNEY. That has been the general experience as we go back into our early history. We found a tremendous number of minerals that were not economic at the time. They have lain dormant and been developed later as they became economic.

The CHAIRMAN. One way to stop mining minerals is just to take the profit out of it, isn't it?

Mr. ROMNEY. That is the quickest way to stop it, sir. [Reading:]

The Atomic Energy Act, Public Law 585, was passed in 1946 by the 79th Congress. It established the framework for a domestic uranium mining industry. As late as April 19, 1948, that industry was activated through publication of AEC Circular No. 1 outlining guaranteed minimum prices for uranium for a 10-year period. Further provisions were subsequently made for exploration, development, and freight allowances, production bonuses, etc.

Statistics demonstrating results are of course classified information, but one has only to read the news clippings over the 5½-year period since April 1948 to obtain a fair idea of the phenomenal growth in exploration, volume of production, and area of potential production to see that attainment of the domestic uranium program has been high.

Prospectors of all categories, individuals with little other than courage and hope to back them, to well-financed groups and experienced mining companies, have explored the known areas of uranium mineralization and have looked for and found new areas.

The incentive for mineral exploration early established under the mining laws and under the promise of gain for the discoverer has again been vindicated through this prolific growth of uranium discovery and mining. There are but few situations in our past mineral history which exceed or rival that of uranium over the past 5 years. The age of prospecting is not dead—it has been dormant lacking proper incentive.

In September of 1952, I gave a paper at the American Mining Congress meeting in Denver. It was titled "The Prospector—Still the Foot Soldier of Mineral Exploration." I would like to repeat the first paragraph here:

"The foot soldier is still the backbone of the Army and the prospector is still the foot soldier of mineral exploration. A prospector might properly be defined as any man, group of individuals or company, who searches for ore bodies by manual means, who guided by eye and experience examines outcrops, mineralized areas, either developed or undeveloped, to determine their potential value for mining or for the extension of mining operations. This definition obviously includes the oldtime prospector—what few of them there may be left—the part-time or Sunday prospector, the individuals drawn together by common mining interest into partnerships or small corporation, and the exploration staffs of the larger mining companies. These are the individuals and groups who have found our mines in the past and who can be expected to make the major discoveries of the foreseeable future."

The forecasting done in the last sentence to the effect that the prospector could be expected to make the major discoveries of the foreseeable future, was not so much of a forecast as it was a statement of what was then in progress in the uranium field. I and no doubt many others did not even then appreciate the extent of activity, the results already attained.

The doctor in Torrey, Utah, who in his spare time searched for mineralized petrified trees—and incidentally found one—but typifies the general interest in the search.

Such names as Temple Mountain, White and Red Canyon, Big Indian Valley, Monument Valley, Marysvale, Grants, Lukachuki Mountains, Shiprock, Hite, Polar Mesa, Lisbon Valley, etc., were until recently little known and then related only to scenery or Indian country in most peoples' minds. Now they all mark some significant uranium development or activity.

Marysvale, Utah, deposits were first discovered in 1949, the area at Grants, N. Mex., in 1951, the Utex Exploration Co.'s fabulous find late in 1952. Meanwhile, less conspicuous discoveries were being made by hundreds of individual and company efforts in Colorado, Utah, Arizona, New Mexico, South Dakota. The latest find seems to be in Wyoming, and there are constant rumors about showings in other areas—further attesting to the farflung activities of the prospector. Let me quote the article announcing the Wyoming discovery. It personifies the prospecting effort, proves that demand and incentive will prompt the effort to get results.

This quotation, and I regret not having made the proper reference here, I will give it to you. It is from the Washington Star of about October 30. I will furnish the committee with the exact date and reference.

The CHAIRMAN. Thank you.

Mr. ROMNEY (reading):

The Atomic Energy Commission today confirmed what it say "looks like an important new discovery" of uranium-bearing ores in remote lands of central Wyoming.

Charles C. Towle, Chief of the Denver Exploration Branch of the AEC, said because of the isolated area "it is going to take considerable time to evaluate and determine the extent of the ore deposits." * * *

The discovery—credited to Neil McNeic, a prospector— has started a rush of other prospectors to the public lands 50 miles east of Lander in Freemont County. The nearest railroad point is Bonneville, a station on the Chicago, Burlington & Quincy, about 25 miles northwest of the discovery.

Mr. McNeic's find has been confirmed by two AEC geologists, Mr. Towle said. Other AEC geologists are going into the area in trailers and will make intensive examinations. "On the basis of the first tests," Mr. Towle said, "the ore which is in the form of carnotite, will be of commercial grade."

The significance of that statement is, I believe, framed in a few words: "Important new discovery—in an isolated area by a prospector."

September 12, 1952, the Salt Lake Tribune quoted a Mr. Dunning, dean of engineering of Columbia University and atomic-energy scientist, as stating that the Colorado Plateau area then produced about 10 percent of our domestic uranium needs. How accurate that statement was, what our needs may be, or what greater percentage of those needs our present production may be, I have no way of knowing. The increase in both actual and potential production since that time has been substantial and promises to increase at accelerated rate.

It is highly probable that present discoveries are only marking the potential producing areas. More intense exploration and improved methods of detection in those areas could prove the first prospecting discoveries to have but scratched the surface.

One problem of uranium prospecting which has had much recent publicity is that of conflict between mining claims and gas and oil leases. I will not attempt to discuss the details or the history of that conflict, but only wish to comment that the act passed by the last session of Congress, permitting claims located after July 31, 1939, and prior to January 1, 1953, to be validated, was a great help to the uranium miner. It opened a broadened area for his activity and lifted the cloud of questionable validity from many mining claims. There are others in attendance much better qualified to give details on this matter than I, therefore I refer to it only in the sense that the act has served to make easier the way of the prospector.

I think a brief statement on a contrasting situation will serve to emphasize the favorable conditions prevailing in uranium for prospecting and development of new mines.

Adequate incentive to stimulate prospecting and stability of price to permit planning through development and mining are features present in uranium but lacking in most other metals, particularly lead-zinc.

Through the period of the uranium boom, 1948 to present, we have seen lead-zinc drop from 21½ cents in 1948 to 10.5 cents in March 1950, climb to 19 cents in 1951, then fall again to 12 cents in April of 1953. Zinc has followed the same pattern. The range has been 17.5 cents to 9.25 cents to 19.5 cents to 10 cents as of September 1953.

Alternate periods of artificial scarcity and oversupply have been at least partially the cause. In periods of oversupply, Government has given preference to foreign producers in stockpile purchases and shown sympathy for tariff reduction rather than protection for domestic industry. In scarcity, Government has given preferential treatment to foreign producers in aid funds, grants, and loans, meanwhile calling on domestic producers for maximum productive effort.

Exploration and development incentive has been largely destroyed through "chicken or feathers" price variations; through undermining any reasonable opportunity for long-range exploration, development, and mining, and through the growing threat of the industry being "sold down the river" through the threaten-

ing philosophies of "trade not aid," "buying raw materials from the cheapest source," and "that keeping our metals in the ground as reserves is good conservation."

A mining industry must follow a normal cycle of exploration, development, and mining or its dies. Utah has produced 4.75 million tons of lead. Reserves have never been more than a mere fraction of that figure. Exploration, development, and mining have in their normal cycle made possible that production. Without restoration of the incentives for exploration and development, lead-zinc mining is in a state of liquidation.

Let us hope that uranium continues to enjoy a climate favorable for its continued growth; that it may attain a level of production consistent with our need in emergency.

Thank you.

The CHAIRMAN. Mr. Romney, you have made a very intelligent and clear statement. I think your statement is entirely clear. It is the history of practically all minerals, that when a long-range profit incentive is there, that the minerals and materials are generally found in considerable quantity. Is that your experience?

Mr. ROMNEY. That is correct, and I feel that uranium mining and its growth has added further testimony to that principle.

The CHAIRMAN. There was a period where it was maintained that all land had been prospected and all discoveries had been made. That was the basis of the policy of saving and conserving our minerals by leaving them in the ground, was it not?

You are very clear in your statement that you think the only way you find minerals and materials is to have a long-range profit in sight. We have long talked about gold, and everyone going after gold. Nobody goes after gold any more because it is not in the profit category. Generally speaking, is that true?

Mr. ROMNEY. Generally speaking, that is true. There is only one major gold-mining operation in the United States today where the production is predominantly gold, and the exploration field for gold is practically dead.

The CHAIRMAN. If the price of gold caught up with inflation, probably gold production would not be much of a problem, would it?

Mr. ROMNEY. I don't think there is any question about it. I think that a great number of individuals and a large number of mining companies have tabulated in their minds gold properties that they would like to have a chance to explore further or to operate under the proper price.

The CHAIRMAN. You are aware that testimony brought out in Washington on many of the materials, such as lead and zinc, is that some of the countries to which we transferred money during the period following the Second World War purchased large quantities of minerals, such as lead and zinc, and then shipped them to this country which had some effect on the market?

Mr. ROMNEY. Yes; that is quite true. I think most everyone is familiar with the British stockpiles that were accumulated to a great extent through the finances made available to them from this Government.

The CHAIRMAN. To the extent of about $2 billion to purchase such materials and minerals.

Mr. ROMNEY. Well, you would know that figure better than I, but it must have been substantial. But nevertheless that stockpiling was done as much on a speculative basis, I feel, as on a protection basis, or

a protection against emergency. But regardless of that, when it was determined that there was no need for such large stocks, and that the speculative incentive of acquiring a corner on those materials was gone, then they shipped large quantities to our market. A good share of it went into the stockpile, but it is interesting to note here that many other countries shipped accumulated stocks during that same time, both consumers and governments shipped stocks at that time to this country, which served to depress prices.

The CHAIRMAN. The only point in referring to those minerals and materials is that we wouldn't want this material to fall into the same category.

Now, Mr. Romney, naturally as we have said before, we are asking for no classified material and information, even if you have it, and I do not know whether you have classified information or not.

But in reviewing the history of this important material, and, of course, it was not so important until we were able to use it, what would be your general idea of the future, if the Congress, either through adoption of proper principles or through the continuance of the purchase program on a rather permanent basis, made it profitable to find and mine this material? Looking ahead several years, do you think we might ever have an opportunity to be self-sufficient in the production of this material in the United States and in the Western Hemisphere?

GREAT POTENTIAL

Mr. ROMNEY. Well, I wouldn't care to put myself on record as trying to answer that in a positive, affirmative manner. I do think that the field is just being scratched in this country. I know little of what has gone on in Mexico and South American countries in the uranium field.

The CHAIRMAN. Or Canada?

Mr. ROMNEY. Or Canada. I do know that Canada has a fairly substantial production, but I do believe that the growth of the industry here, growth of production, the increase of interest, the increase in the numbers who are seeking minable deposits, attests to a great potential in this country.

Now what actual magnitude or relative magnitude that will reach in relation to our needs, there are possibly not more than 1 or 2 men in the United States who could answer that question in any positive, affirmative manner.

I do think there is a possibility of greatly improving our position as far as self-sufficiency, yes.

The CHAIRMAN. For the purposes of the work of this committee, we are not concerned with peacetime purchases, except under principles which would make it profitable to mine our own minerals under our standard of living, wages, and competition.

It is not the idea of the committee to even imply or indicate that we do not want to purchase from foreign nations. We certainly do in this particular mineral, but if war, an all-out war, came suddenly, we do think—at least the chairman believes, and I think I am speaking for the chairman of the committee in that regard—that the more we could become self-sufficient by speeding up production, the safer

we would be, since we are now dependent on offshore areas, for minerals without which we cannot fight a war, and without which we cannot manage our own economy.

TO DETERMINE PROGRESS

So the general objective of the committee, without asking at this time for any classified information, is to determine the progress we are making and what the future holds. You believe there can be an immense improvement and additional production under the conditions now prevailing. Is there any means by which the long-range profit system can be further implemented to increase production, so that much more material will be found?

Mr. ROMNEY. That is right. Certainly our production, just from what we read in the paper, and our potential areas, have increased geometrically over the past 5 years. Each year has brought a tremendous increase.

The CHAIRMAN. You didn't mention Idaho. I understand there has been a find in Idaho.

Mr. ROMNEY. I heard a rumor of that. I was unable to get any factual data on it.

The CHAIRMAN. Also there has been a discovery in Nevada, I understand, since I arrived here.

Mr. ROMNEY. I am sorry I overlooked that, Senator. Has that been recent?

The CHAIRMAN. I don't know how recent or how important, but we have witnesses here who will bring it out.

Maybe our theoretical prognosticators over the years have overlooked our laboratory work and the development in the United States of processes for new materials. For example, two of the materials that are probably most valuable right now were practically unknown, not unknown to engineers, but unknown in the actual commercial field a few sort years ago. On one of them we have just completed our hearings. We are hearing the Du Pont Co. in Washington sometime late this month, the 23d of this month. They have a contract, a 10-ton-a-day contract for producing titanium. They have not reached their objective as yet. The Titanium Corp. in Henderson, Nev., with Hoover Dam power, will produce a little less than half of their contract, which is also a 10-ton-a-day contract.

Now, we are getting rutile from Australia, to which we have no objection. It is a fine idea. But in case of a war we are determining how self-sufficient we could become here, and the testimony shows that ilmenite, another form of the raw titanium material, is plentiful in the United States and in Canada. The testimony also shows that instead of the 2,500 tons we are now producing in the United States, the airplane manufacturers of both war and commercial planes, whom we heard in Los Angeles last week, if they could take their plans off the drafting boards and know titanium was available, just as aluminum and stainless steel are at this time, could probably use 100,000 to 150,000 tons a year, and in times of all-out war, probably three or four times that amount.

So it looks a little silly to be obtaining the ores for titanium from offshore areas.

It is no criticism of anyone. Even in the titanium industry what the committee wants to do is to assist them now, and to remove any roadblocks, if possible. Now then there is ilmenite and some rutile in this country. There is plenty of ilmenite production here. This hearing today, and these other hearings are about materials that a few short years ago were not even usable. Engineers knew about them, but just always knew it as a material. That is about all.

So today all the prognosticators tell us we must save our materials, that everything has been prospected, that there is no chance of finding anything any more, and that we must save what we have. They have not proved very long ranged or farsighted in the field of materials, minerals, and fuels. Do you agree to this?

Mr. ROMNEY. I agree with you wholeheartedly, and I have felt the same about the mineral materials, certainly, which I was most familiar with while I was in the exploration field.

The CHAIRMAN. Do you have any further statement to make at this time?

Mr. ROMNEY. No, sir.

The CHAIRMAN. We will continue through tomorrow, and if you think of anything new you would like to include in the record, you may submit it for the record, or appear again.

Thank you very much.

Mr. ROMNEY. Thank you.

The CHAIRMAN. Senator Murray, do you have any questions?

Senator MURRAY. No. I just wish to congratulate the witness on the very clear statement he has made. I think we are all in agreement, that we must encourage the production of these scarce, these rare metals, in case of war. We can't depend upon offshore supplies, and therefore we should make every effort to stimulate the production and exploration in this country, and I am thoroughly in agreement with you.

The CHAIRMAN. Thank you.

Mr. ROMNEY. Thank you, Senator.

## STATEMENT OF ROBERT S. PALMER, EXECUTIVE SECRETARY, COLORADO MINING ASSOCIATION

The CHAIRMAN. Now Robert S. Palmer is the executive secretary of the Colorado Mining Association.

Will you come forward, Bob?

Bob, speaking as one member of the committee, I have long had a high regard for you and your work, and the work of your association. I have been familiar with your work for many years, and generally speaking, there is very little that you overlook.

Please identify yourself for the record and go ahead in your own way.

Senator MURRAY. I might say before you start, I would be very disappointed if I didn't find you to testify here at this time. I don't believe I have ever attended a hearing involving mining that I didn't find you there giving your valuable information and suggestions. I am glad to have you here.

Mr. PALMER. Thank you very much, Senator.

Chairman George Malone, and Senator James Murray, I have been asked by Gov. Dan Thornton, of Colorado, to express his best wishes to both of you and to express his deep interest in this hearing, and to assure you that he would have been here if it had been humanly possible.

He has asked me to attend, to represent him in my discussion of this important question, and to express to you his appreciation for the grand work that you are doing. May I add that it is a distinct pleasure for me to appear before a Senate committee where the Senators conducting the hearing are thoroughly acquainted with the problems of the mining industry.

The mining people of the United States are not always prone to express their appreciation to United States Senators for the work that they are doing for the industry, and I know the grand work that both of you have done and are doing for the industry, and I hope that you will be able to continue to work for many years to come.

Both of you are familiar with the Colorado Mining Association and its work. Both of you have attended its annual meetings, and both of you have attended the annual sowbelly dinner, so I feel in making a statement about the personnel that I represent at this hearing, that both of you have a clear picture before you of the people that I represent.

The Colorado Mining Association represents the largest segment of uranium production in the United States. Its members are active in the uranium-producing sections of the Colorado Plateau, Wyoming, South Dakota, Nevada, Montana and other areas where uranium is being sought after and produced.

Senator, I would like to have you know that I am the first shipper of uranium from the State of Nevada. Unfortunately the claim is not quite up to the requirements of the AEC, but we are still hoping that the State of Nevada will be much in the picture before we get through.

The CHAIRMAN. I hope so, and also Montana and all of the States. The real work is being done by you fellows in the field. I think I have often expressed myself that you can't do your mining on the Senate floor or in a bureau in Washington. You have to consider the facts in the field, and I feel as you do that the personnel of the committee have been exposed to about all of the hardships and the difficulties that befall prospectors, miners and would-be miners. It is that hope, or that little valley at the end of the rainbow that keeps prospectors in the field, and we hope puts them back in the field.

Mr. PALMER. Thank you, Senator. [Reading:]

**In this area the major production in the United States is taking place. Uranium ore production is increasing at an excellent rate and official releases indicate that it has more than doubled during the last year.**

**The raw materials subcommittee of the Joint Committee on Atomic Energy of the United States Senate, in its report released on June 30, 1952, stated in part: "(1) The Atomic Energy Commission should rapidly and substantially increase uranium or thorium production from domestic sources; (2) The military cannot escape responsibility for fixing weapon requirements at whatever level needed to defend the United States most effectively and cheaply. * * * Considering the possibility that foreign ore sources might be cut off, considering the inability of our own country to control the timetable and the intentions of a potential enemy, and considering the possibility that our military will continue to revise upward their estimates of minimum weapon needs, the rate of ore procurement should be rapidly increased."**

The CHAIRMAN. You might include at that point too the demand, the potential demand for commercial developments in the power field.

Mr. PALMER (reading):

"The subcommittee places heavy stress upon the objective of reducing the dependence of the United States upon foreign sources of uranium ore. * * * This is extremely important; for it is likely to remain true for a number of years that, because of inadequate domestic production, any stoppage in the flow of ore from overseas would expose the continuity of operation of some of our national atomic energy production plants to the most serious threat. * * * During the past 18 months, the Commission has undertaken a considerably increased exploration effort on the Colorado Plateau, consisting of geological studies and a diamond drilling program designed to locate ore. * * * Actually, it was true during the early postwar years, as it is true today, that the quantity of uranium ore obtainable rises or falls with the degree of effort exerted to this end. Just as iron or copper or gold or virtually any other raw material may be produced in greater quantities, given time and given a willingness to pay the necessary cost, so uranium may also be procured in greater quantities, likewise given time and given a willingness to pay the necessary cost. Members of the joint committee representing States where mining is an important industry have long maintained that such is the case.

"Production to date has come largely from the old vanadium mining areas of western Colorado and eastern Utah. To the south and west of this region, along the Colorado River, lies an area as large as New England and embracing some of the roughest country in the United States. Here is a great desert and mountain region essentially without roads or water, but containing many miles of outcrop, which, we are informed, encourages exploration for the development of uranium. Uranium also occurs in shale deposits located in the States of Kentucky, Ohio, Indiana, and elsewhere.

"The subcommittee specifically recommends a far larger and accelerated exploration activity and diamond drilling program on the Colorado Plateau along with the necessary access roads for exploration and recommends a rapidly expanded development program of known commercial deposits and those discovered by exploration programs.

"Generally speaking, the scope and scale of the Commission's efforts to locate new deposits and sources of uranium should be expanded. Too much emphasis can hardly be placed upon the fact that active prospecting for uranium within the United States has been under way for less than 4 years and in a country as large and as rich in mineral wealth as our own, it is a virtual certainty that good producing areas exist but have yet to be located."[1]

We, the members of the Colorado Mining Association, share the view of the Raw Materials Subcommittee of the Joint Committee on Atomic Energy and of the Minerals, Materials and Fuels Economic Subcommittee in realizing the important relationship of uranium to the defense efforts of the United States, as well as to the economics of the uranium-producing areas. We also share the view that maximum production, aimed at self-sufficiency, is necessary and essential if the safety and security of the United States is to be protected.

Recently, Thomas E. Gillingham, Chief of the Physical Exploration Branch, Division of Raw Materials of the Atomic Energy Commission, announced that production from the uranium deposits of the Colorado Plateau type in several of our Western States now ranks the United States in second place among the world's uranium-producing countries. The term "Colorado Plateau type" is used broadly to include all those deposits, with the exception of the uraniferous phosphates and lignites, that occur in the relatively flat-lying sedimentary rocks of the Colorado Plateau and adjacent areas of the Western States. These ore bodies are typically flat-lying, similar in many respects to the flat sedimentary beds in which they are found, but they are irregular and somewhat illusive, as many a prospector has found. They do resemble, in some respects, the lead and zinc deposits of the Tri-State and the Illinois-Wisconsin lead-zinc ore bodies.

Some of these deposits contain associated minerals such as vanadium and copper. Deposits of this nature are often classified on the basis of the products produced from them and are referred to as roscoelite type, carnotite type, and copper-uranium type, but all these types, from the miners' viewpoint, are similar.

[1] Report of the Raw Materials Subcommittee of the Joint Committee on Atomic Energy, 82d Cong., 2d sess.

The ore bodies on the Colorado Plateau range in size from a portion of a ton to several hundred thousand tons. In the Morrison formation, where vanadium mining was formerly conducted, deposits are to a certain extent erratic, widening and narrowing down and causing many a miner a severe headache. The average grade of separate ore bodies ranges from around 1.1 percent $U_3O_8$ to as much as 1 percent, though a composite average would be closer to the lower figure. Some estimates have been made doubling this amount. The average thickness is said to be about 5 feet but in some instances narrows down to a few inches or widens out to 15 feet.

The ore seems to meander within a favorable bed. These meanderings are sometimes referred to as channels. There may be a band of ore in the floor of a drift and another in the back. Within a few feet, either or both of these may pinch out or they may coalesce and swell to form solid ore from floor to back. The ore may roll or twist, go up or down, or just down and out, which is most disappointing to the average prospector.

Geologists may be smart people but they have not been able, so far, to tell the miner what to expect. The good miner, unless he is starving to death, follows his ore even under adverse circumstances. By reason of these obstacles, it is the judgment of our association that the uranium miner should be given every possible encouragement.

In the shipping of ore, the miner of the average plateau deposit must watch the grade closely. Profits are made from mining an average grade of 0.2 percent $U_3O_8$ or higher, unless the ore body is large or unless the mine is an open cut and cheap mining is possible. Ore averaging 0.20 percent $U_3O_8$ and 1.00 percent $V_2O_5$ brings a price of $22.20 per ton, if you include the vanadium payment and the development allowance but this figure does not include the initial production bonus.

The uranium miner sends his ore to a mill and doesn't generally bother himself about processing his ore. Certain of these mills with acid circuits have difficulties with excessive lime, so that, understandably, a penalty for high lime is imposed in certain areas. If the ore contains zinc, lead, silver, and gold, these metals are not paid for unless they are found in sufficiently large quantities, in which event special arrangements might be made.

Suffice to say that metallurgical problems are complex but are being studied by private and governmental groups.

More recently, prospectors have been at work in areas where the Morrison formation has been eroded and have found substantial deposits in those formations generally referred to as the Chinle, Shinarump, and rare instances have been reported of uranium deposits in the Moenkopi and the Cutler.

In determining the extent of ore bodies, deep drilling has been resorted to by numerous drilling companies employed not only by the Atomic Energy Commission but by numerous individuals and mining companies. The sensational finds in the Happy Jack, west of Blanding, Utah, by the Bronson & Cooper Mining Co.; Charles Steen, in what is now known as Steen Canyon in Utah, close to the Colorado border; Vernon Pick in the Green River area of Utah; and numerous other prospectors at Temple Mountain, Marysvale and the numerous means which exist both in Colorado and Utah have proven sensational news throughout the country.

At one time it was thought that the United States could not produce its requirements for uranium and certain atomic secrets were threatened because of the insistence of foreign governments that these secrets be disclosed or uranium from foreign lands would not be forthcoming. Thanks to the able leadership of Blair Burwell, a former president of our association, and Senators Millikin and Johnson of Colorado, the threatened disclosure of information was avoided and emphasis was placed upon the production of uranium by the Atomic Energy Commission on the Colorado Plateau. The raw materials' headquarters was established at Grand Junction, Colo., and men of the highest type were selected to administer the affairs of this elaborate setup, which brought together a great many of the finest technicians in the United States, as well as geologists and field representatives.

The program has produced results and results are necessary if we are to free the United States from dependence upon foreign sources for our raw materials. There are those in Washington and in some of the industrial centers of our Nation who feel that we should keep our minerals in the ground and save them for posterity. The facts are that had this policy been pursued, very few of the vast deposits of uranium would have been found within our borders.

Encouragement to the prospector, to the little miner, is vital for the future of our Nation. Some great thinkers would have us believe that the day of the prospector has passed, that we must resort to the highly efficient mining company for future discovery of our minerals. The facts speak for themselves. The major discoveries on the Colorado Plateau have been made by the little miners, the prospectors, some of whom were not engaged in mining prior to their sensational discoveries. Others were new to the game but well trained in their professions.

Recent developments also prove the advisability of encouraging major mining companies to enter the uranium field. For example, the Anaconda Copper Mining Co. has done a great deal of research work and is able to recover uranium from the low-grade ores in New Mexico—treat the ores with a high lime content. Other companies have made improvement in milling processes and we are informed that a great deal of research work in this field has been, and is being done by the Atomic Energy Commission in Grand Junction, Colo. New mills will undoubtedly be necessary to take care of increased production. Present mills must be supplied with the ores as directed by the Administration and new mills should be provided for marketing in those areas where haulage costs are important.

The Atomic Energy Commission, in the judgment of our uranium committee, of which Tom Rummel of Grand Junction is the Chairman, has done a remarkably fine job in assisting the States in which uranium is found, in the construction of roads. Far more money has been appropriated by the Federal Government for the construction of these roads than has been provided by either the State or local governments. This is understandable for it should be remembered that major uranium finds have been made in sparsely settled areas, usually many miles from towns or highly populated communities. The construction of these roads would not have been possible had not the Atomic Energy Commission received appropriations with which to carry out construction work.

We appreciate this job, the job done by the Bureau of Public Roads, and the highway departments of the various States and counties which have cooperated. There is much room for improvement and our association advocates the construction of roads as one of the greatest aids to the uranium industry.

The Congress of the United States recognized the necessity of encouraging exploration, particularly among the small producers, and enacted legislation, largely advocated by the Colorado Mining Association, permitting exploration costs up to $75,000 per year to be made for a 4-year period and deducted from income-tax payments. This provision has not been clearly interpreted by the administrative agencies and some clarification is desirable. Depletion allowances are not sufficient to encourage uranium production. The uranium industry should have a 50-percent allowance for depletion if maximum production is to be encouraged. The Colorado Mining Association is presenting facts and data to the Congress on this particular point and is hopeful that at the next session of Congress, the revenue acts will be amended to permit this allowance, which is in the public interest and will encourage producers to increase production of uranium throughout the uranium-producing areas.

It is the position of our committee and of our association that we do everything humanly possible to cooperate with the Federal Government in the encouragement of uranium production and in attracting new people into the uranium business, preferably people of experience, with plenty of know-how.

We are not of the opinion that uranium producers, generally speaking, are getting rich. By far the larger percentage of uranium producers are losing money. Many who have obtained leases from the Atomic Energy Commission, where, presumably, ore bodies have been drilled out, have been losing money in their efforts to produce uranium. These facts show that it is the unusual situation which has received a great deal of attention in the public press and not the average situation, where the grade of ore does not meet the expenses of efficient mining. It is hoped that in the future, with improved processes, some way will be worked out—in the name of conservation—in the name of efficiency—whereby lower-grade ores can be mined and treated economically.

We believe the evidence will show that the Colorado Plateau has the greatest potential of any uranium area in the world. We believe that the Colorado Plateau will become the No. 1 uranium producing area of the world. In years to come, the United States will require greater and greater quantities of uranium. To depend upon foreign imports is silly, is dangerous, is downright

outrageous. The more ore mined, the more ore is found. The miner's doctrine that "ore begets ore" is true in uranium just as much as it is in zinc, lead or any other metal. The United States is a "have" nation as far as its uranium reserves are concerned and the Colorado Plateau and adjacent areas can and will provide the Nation with the uranium it needs for many centuries to come.

We appreciate the great work that is being done by the chairman of the Subcommittee on Minerals, Materials, and Fuels, and we subscribe, wholeheartedly, to the expressed ideas of his committee that the United States encourage the production of all minerals within its borders, and prevent the horrible experiences which other countries have had when they place a dangerous dependence upon foreign supply.

That is the statement, Mr. Chairman, that I was asked to present at this meeting.

The CHAIRMAN. Mr. Palmer, you left very few questions for the chairman to ask.

You are aware of the reasons for the hearing, first to find out what the situation is from the men in the field, and I have never discovered a better way to find it out in 30 years of experience in the engineering field, than to ask the men who are actually operating under the act. You, of course, are aware of the hearings held by the committee under the bill introduced by the two Senators from Colorado, Eugene Millikin and Edwin C. Johnson. Senator Millikin is a member of this committee. I understand he is in Europe at this time or he would be here.

You have always been a source of not only vital information but the development of principles under which the strategic and critical minerals and materials could be produced. You are aware that not only war demand but also commercial demand is imminent. The chairman of the committee has been advocating and agitating this commercial power for several years, and is not the only Senator doing that. I didn't mean to imply that he was, but it has been my personal opinion that instead of trying to compete with, say, Hoover Dam power where it is 2 mills at the switchboard, if they would get up in the mountains of Montana, Nevada, and Utah where the power is about 2 or 3 cents a kilowatt, there is a great field almost upon us for the use of commercial power from this important source of energy. I think you agree.

Mr. PALMER. I agree wholeheartedly with your statement, Senator.

The CHAIRMAN. You are also aware, I am sure, this is not the first investigation into raw materials the chairman has conducted. We did turn out a commercial industrial encyclopedia in 1944. It took 6 years, and you, Boulder College, your mining college, and your State officials, assisted us materially. That encyclopedia did include a comprehensive description of the Utah and Colorado Plateaus as to the possible production of uranium ores, also of milling operations that would be necessary, and potential uses. You are familiar with that?

Mr. PALMER. It is an excellent publication and a very fine reference book, Senator. We have used it on numerous occasions.

### NEED CONTINUITY OF PROFIT

The CHAIRMAN. Now if I understand your testimony, what you are saying is that what the mining industry needs is just about the same as any other industry, whether it is the watch, or precision instrument,

or crockery industries, that it, some kind of long-range principle under which they can operate, that assures a continuity of a profit in a product when your investment is finally made; is that right?

Mr. PALMER. That is correct, Senator.

The CHAIRMAN. In any other industry you can see the buildings, and you can see whether they will be competitive or not. In mining you may spend your money and find nothing. Do you agree? I am sure you do from your statement. In order to produce any mineral it requires the prospector and the explorer, to take hundreds of showings or stringers of ore in order to find one or more for which an engineer will recommend some money be expended by his client; is that correct?

Mr. PALMER. That is correct. We thoroughly agree with you, Senator, that the proper incentive is all that the mining industry needs to go out and find the minerals which the country will eventually require if it is to maintain its safety and security.

The CHAIRMAN. On the floor one time in a debate in the Senate, the chairman said that under the principles adopted by some of the Government officials, their view would lead you to believe in saving these minerals and that all you needed to do the morning the war started and you needed the material was to just take a pair of broncos, hook them up to a buckboard, take a hay knife, go up on the side of the mountain and cut off what you need and come back that night.

Mr. PALMER. You, Senator, and all the members of your committee, know full well what occurred during the last war when metals became in short supply, and we know what efforts were made on the part of our Federal Government to get increased production at a time when manpower and equipment was in short supply. You, I am sure, agree that many a Government official stayed awake at night worrying about the ships that were being sunk carrying metals to our shores, which we desperately needed, and I testified before your committee at Seattle that during the emergency which existed the Government saw fit to go up to the city of Leadville, in that area, and started the construction of a long drainage tunnel, when men were in short supply and equipment was badly needed.

In other words, our experience has been in the mining industry that we get kicked around a little when metals are plentiful, but in times of emergency pleas are made to us to get our increased production, and there does not seem to be a realization on the part of many executives, and maintaining manufacturing lines, that it requires a great deal of time to get mines into production, to get staffs together, to get the miners with the know-how. I would like to emphasize here that a miner in a metal mine today is a highly skilled worker. He is a very able person. He is not the type of person you used to think about in the good old days of Cousin Jack. Although they were efficient miners, today it is a recognized fact that the miner is a highly skilled person, trained in his position, and it seems most unfortunate that any policy of our Government would discriminate against these men and force them into various other lines of endeavor, which they are being forced in today by reason of the senseless policy, as I see it, on lead and zinc.

LABOR COMPETITION

The CHAIRMAN. Can a $15 or $18 a day miner in this country compete with the low-wage areas of Africa, Europe, and Asia, when they have available to them our machinery and methods, such as they do have at the present time? Has there ever been a time when they could compete on an even basis?

Mr. PALMER. No, I think the chairman's statement that the importation of raw materials from abroad is simply the importation of cheap labor from abroad is right, and is a discrimination against the American worker.

The CHAIRMAN. Then some method probably would have to be adopted to take the profit out of this sweatshop labor, to end any principle which would discourage a long-range objective in mining?

Mr. PALMER. Correct.

The CHAIRMAN. One objective of the committee, is to determine how self-sufficient we might become in the production of this metal, both here and in the adjacent nations of Canada, Mexico, and others in the Western Hemisphere, if proper and intelligent conditions can be established for the mining of this material. Did I understand you to say that in your opinion, under such a program, we might become self-sufficient within the Western Hemisphere and probably in this country?

Mr. PALMER. We can become self-sufficient with the proper mineral policy in the United States. I would like to add here that I think personally that the Atomic Energy Commission has done a splendid job in pioneering in that field.

I realize, probably as few men in the West do, the obstacles that members of the Commission have had to overcome in meeting this problem, of getting this program adopted and approved by people who are not familiar with it, and who do not represent the raw-material-producing sections of the country. My personal attitude is that instead of criticizing these individuals who have done this splendid job that they should be highly commended, and they should be helped and they should be assisted.

It has been my experience, personal experience, that when I have sat down with these men and talked with them about problems, that they have done everything within their power to try to solve them to the satisfaction of those who were trying to produce. There have been times when there have been disagreements, of course, disagreements on policy, but I feel sometimes that the people who have criticized are not well advised as to the size of the United States, and the terrific problems which you United States Senators from the West are up against in representing this section of the country, and I am fully appreciative, I think, of the splendid work that has been done in this field, and I am of the opinion personally that it should be a model for some of the bureaus and agencies in other lines of activity in our Government.

The CHAIRMAN. Mr. Palmer, you are aware, as are all the Senators on this committee, that when the first discoveries of uranium were made, that the then Secretary of the Interior announced that any discoveries belonged to the Government and thereby promptly stopped any prospecting. I guess you will agree with that statement.

Mr. PALMER. I agree with you, Senator, that there was a tendency on the part of a former Secretary of the Interior to restrict the use of our public lands for mining purposes.

The CHAIRMAN. What I meant by that, is misunderstanding of the ways of encouraging production and the discovery of new metal and further reserves. The policy of saving what you have would result in general discouragement in the whole field of development.

Mr. PALMER. That is correct.

The CHAIRMAN. I fully agree with you, that the Atomic Energy Commission has made great progress and should be encouraged. No one should ever criticize unless they have constructive suggestions. The personnel of this Commission, as far as I can see, are very receptive to suggestions.

Now the occurrence of this metal, as you have testified, or I think has been testified, in kidneys or pods, if the encouragement through price is there on a long-range principle, they keep on mining and discovering more and more of the material.

Mr. PALMER. That is correct, sir.

The CHAIRMAN. That is about the way chromite appears in many areas, and Senator Murray states they have a large low-grade deposit there that is in better shape, but in the high-grade deposits it occurs in that manner.

Mr. PALMER. That is right.

The CHAIRMAN. What minerals are generally found together with the uranium ores?

Mr. PALMER. Carnotite ores generally contain vanadium. In fact, the history of the Colorado Plateau is a history of the development of radium first, and then vanadium, and more recently the uranium, and uranium and vanadium being found in those ores. There are areas in which the vanadium content is practically nil. There are areas in which copper is found in conjunction with the uranium ores, and then there are a few areas in which silver is found with uranium, and more recently some of the prospectors have been finding uranium in lead and zinc deposits.

I wouldn't be one to say you wouldn't find it in almost any mineralized deposit, because if you believe in the theory that there has been a change in the mineral composition of a deposit since its original deposit, then you can quite see that there has been a change taking place.

I have listened at length to the different theories on ore deposition on the Colorado Plateau, and I don't know which one I will subscribe to, but I will say that it indicates to me a healthy situation in the Atomic Energy Commission when there is a difference of opinion expressed within their organization, and where the organization has sense enough to come out and publish the documents which are available for the use of prospectors in which the different theories are propounded. If we had a dictatorship or a socialistic Government, that situation wouldn't prevail.

I would like to call the members of the committee's attention to the very fine report that has been published by Charles Steen and the United States Bureau of Mines, and the survey of the Atomic Energy Commission in their studies in that highly important area in which the famous Steen mine was found.

The CHAIRMAN. Well, you believe that with proper encouragement and the increased production that is possible in the United States and perhaps Canada and adjacent areas, that without stopping the purchases abroad at all, or without any desire to do so, for stockpiling and natural trade with foreign nations in peacetime, it is clearly shown that within a reasonable time after a World War starts, whether you call it the fourth world war or the third world war, we could almost immediately increase our production and together with our stockpile become self-sufficient for a long war. That would remove the threat of blackmail from any foreign nation?

Mr. PALMER. I think that is an excellent point, Senator with which practically everyone will agree that has any knowledge of the subject.

The CHAIRMAN. That is the objective. I think I can say, speaking for the members of the committee—Senator Murray is here and can speak for himself, and the other members will attend the Washington hearings as we proceed, that the committee hopes to ascertain whether we can become self-sufficient in the United States through increased production, or, if not self-sufficient, to what extent, we can increase production under correct and proper conditions, in order that the Western Hemisphere could become self-sufficient.

It is believed by many military strategists that you can keep the lines of transportation open in the Western Hemisphere to a greater extent than you can those lines across either ocean. Do you agree with that objective?

Mr. PALMER. I agree with that, Senator, and I would like to add this, if I may, that the most recently authentic published statement is to the effect that it is anticipated that we will require all the uranium that men can produce, so it seems to me, based on that statement that the position which the association has taken in this hearing is very sound and in the interests of the welfare of the Nation and the people of this country, and that it should be continued, and that the United State Senate should continue to support that program.

The CHAIRMAN. Mr. Palmer, unfortunately in any statement that we will require all of the uranium or manganese, that men can produce, it includes a lot of men in areas where, according to our newspaper reports, and all the information available to us, it is a little doubtful which side they will be on in a conflict.

Now, take your manganese; evidence shows that our stockpile is limited. Evidence shows that we are getting half, or a little more than half, of our manganese supply, eight or nine hundred thousand tons, from India. I had a long visit with Mr. Nehru when I was in New Delhi in 1948—and he is a fine and wonderful man. He is sort of a mystic with tremendous control over his people. But if anyone knows which side of a future war he will be on, it is a puzzle to me. He will be on the side he thinks will promote the best interests of India, and he should be. Now he is entirely neutral, and therefore there is only a potential supply of manganese from India. They can say, "We can't be neutral and supply the manganese," and that would be a very logical position to take, in view of the position he has already taken, but even if he did not take that position, few military strategists believe that we can get very many cargo ships across either major ocean in time of an all-out fourth world war, without so much naval

protection that each ship that arrived in the United States would probably cost us from fifty to one hundred thousand dollars, not including the ships lost. We lost a majority trying to get manganese and chromite from South Africa in the last war. I have already stated the percentage of ships lost during that period.

So I am asking you again if you do not believe that our objective should be to remove that threat? You can call it blackmail, and making us give them our secrets or something else, in return for the material or whatever else you choose to call it, but it is a threat.

Mr. PALMER. We agree wholeheartedly with that view, Senator.

The CHAIRMAN. Now I agree with you. I can understand thoroughly why the people in Washington, no matter how keen they are, or how much they listen to testimony, if they have had no real experience in the business of mining, believe that the miners are getting rich. No one can drive through Virginia City, for example——

Senator MURRAY. Or Butte.

The CHAIRMAN. Or Butte, Mont., or any other old mining area and see the honeycombed hills where no ore is being produced, and not thoroughly believe that most miners die broke. In other words, the men from Virginia City you hear of are the Mackays and the Floods and the Fairs, and they are people who ended up with the paying producers, and not the thousands and thousands of men who went there with hope high in their hearts and worked and spent what little money they had and died broke.

That is the point we have to put over with our Government, our really educated officials. It is simply this, that the only thing that keeps these men working, is the pot of gold at the end of the rainbow, and that is what keeps them in the hills.

Now, in the last few years we have taken them out of the hills. This committee wants to put them back.

Mr. PALMER. That is a most commendable objective, Senator, and I certainly hope that the committee succeeds.

The CHAIRMAN. Senator Murray.

Mr. PALMER. May I make one remark off the record there, sir? I congratulate you on the establishment of a new national organization in recognition of that point.

The CHAIRMAN. Senator Murray.

### PRODUCTION NEEDS

Senator MURRAY. Mr. Chairman, I think you have already covered the field with great detail, and I don't care to burden the record further with any questioning on my part, but I do want to congratulate the witness on the many very fine statements he has made during the course of his testimony.

I appreciate very much the eulogy you made on miners. The miners of this country are men of great skill. They are not ordinary workingmen. Anybody that has ever worked underground with these miners know that they are required to have a great knowledge of conditions in order to be able to protect themselves and to be able to carry on their work successfully.

A miner goes down underground, and he has to look at the character of the ground that he is working in in order to protect himself.

I think the miners of this country are entitled to great credit for the contribution they have made to the success of the mining industry in America. I agree with you also on the many other statements you have made.

These scarce metals and minerals, the producers of them have to be encouraged, because we cannot depend upon the foreign supply, as the chairman has very ably brought out, and we must to the fullest degree possible develop our own sources of supply in this country by encouraging the prospectors and the development of these scarce metals and minerals in the United States.

I am in full accord with what the chairman is trying to do, and I want to congratulate him on the able manner in which he has been conducting these hearings, because I think we are producing a record here that will be of great value in the future, and I wish to submit the case as it now stands.

The CHAIRMAN. Thank you, Senator Murray.

The record is the only thing we take back to Washington, and that is the reason we try to get as complete a record as we can. It is our hope that we can come in with findings and recommendations based on a sufficient background, so that the Senators who do not have the time to listen to all of the testimony, and also do not have the experience in the field of production, might understand it.

We understand and we know that it takes 3 or 4 years for a miner to become really efficient in all of his duties. It takes just about as long as it does to go through college, and when you come out of college without any prior experience, you still have to learn mining the hard way.

Now mining is no different, in my humble opinion, than hundreds of other industries. You have the crockery industry and the precision-instrument industry, and the machine-tool industry. You have hundreds of industries whose existence depends upon a principle established by Congress. When Congress establishes the proper principle, these industries can go to potential investors and say, "We are able to produce this material," whatever it is, whether it is watches, or zinc or lead or crockery, "at a certain price. We are competitive, and we can make this much money." When they can depend upon long-range conditions, then they can obtain investors. When they cannot depend upon them, and do not meet the conditions that they have outlined, they lose the original investor and lose the business.

I speak, not only for the chairman alone, but for the committee, and I believe that we have learned to be patient with people. The State Department's acts are reorganizing the industrial map of the United States and will result in unemployment.

We are taking these men for other work. If you start training a miner to make watches and clocks, you are going to get into trouble, taking a miner out of his occupation. In other words, after 30 years in the engineering business, I found, out of the many phases of engineering, you will only become efficient in 1 or 2, if you are lucky, and maybe sometimes not too efficient in the 1 or 2. That is your specialty, after 15 or 20 years of experience and then you may be of some value to clients or to the workingmen in the industry.

To then be forced to learn another industry is just beyond any understanding. I don't understand how anyone could even suggest

such a thing. They do admit, by that very suggestion, that they are going to put certain people out of business and become dependent on the foreign nations for these things.

Now, understand, Senator Murray and I are only 2 Members out of 96 in the Senate, and we are only 2 out of 13 of the main committee, and 2 out of 5 on the subcommittee. But we are seeking to build a record so that any voting in the United States Senate and in the House can be based on factual material.

I thank you very much for your testimony, Mr. Palmer, and we will stand adjourned until 2 o'clock.

(Whereupon, at 12:20 p. m., November 12, 1953, the instant hearing was adjourned to 2 p. m. of the same day.)

AFTERNOON SESSION

The committee met at 2 p. m., pursuant to adjournment, in room 238, United States Federal Building, Salt Lake City, Utah, Senator George W. Malone (chairman) presiding.

The CHAIRMAN. The committee will be in order.

I think the testimony this morning, the statements by the heads of the two mining organizations of the two States, Colorado and Utah, was very informative and pointed the way. I want to say—and I am sure I am speaking for Senator Murray who will be with us in a few moments—that we want the wraps off in this hearing, with the exception of classified information.

I want to say again that in my humble opinion, in entering a new field, the Atomic Energy Commission, as a new commission, has accomplished surprising results, and any trend that this hearing may take can in no wise be considered a criticism of the Atomic Energy Commission or its personnel.

I know most of them, and I know that their intentions are all right.

We are here, as I said this morning, at the outset, to determine how the new legislation that this committee was instrumental in presenting on the Senate floor and passing early this year is working in promoting the production of this important material, and secondly to determine, under Senate Resolution 143, without interfering in any way with the work of the Atomic Energy Commission, or hearing publicly any classified information, to what extent it is believed by the people who are on the ground, and who know and understand mining, this Nation might become self-sufficient in the production of this important material in time of war, and for our expanding economy, and for the security of this Nation.

I, for one, have argued with the Atomic Energy Commission for 3 or 4 years, that there are certain areas where commercial power nuclear energy can be utilized, right now, under proper conditions. I am not talking about some of these large projects where the power can be secured at 2 mills, 3 mills, or 4 mills a kilowatt, or in the areas of coal or oil or gas where 3½- to 4-mill power is not uncommon, or half-a-cent power. I am talking about the mountain and desert regions where you are talking about cents and not mills.

I have been happy to see, that while the Atomic Energy Commission has not followed some of the actual suggestions some of us have made, that they are now talking about entering the commercial field.

There is very little time to review any history and we do not intend to do that, but in 1947 when I made it my business to go to Birmingham, England, where the steel industry and the coal industry is congregated—that is the one center of production of both—and before I went into the coal mines and the steel mills I visited with the man who was in charge of the coal production in that area. His name was Sir Ben Smith. He told me in words of one syllable, and I had nothing to say because I had not examined any of the material, that in his opinion the United States should continue lend-lease with no hope of repayment. He said the United States must go through with the Marshall plan, and various other methods of aid, and I mention this only to lead up to his final statement to me, and I still had nothing to say because I did not know yet what the situation was. Finally he looked at me and said, "You know, Great Britain controls three-fourths of the raw materials of the world, and if it wants to it can shut down the production and export to any nation that it cares to." In other words it was an implied threat.

Now, I don't think he was talking for Great Britain. He was just one who hadn't been coached not to talk too plain. But I used that on the Senate floor, and it is still the attitude of many foreign nations.

Therefore, either in wartime or peacetime, whenever our industry is dependent on these foreign areas, you are subject to a mild form of blackmail, and maybe a not so mild form of blackmail. They will require certain actions by the State Department or President or Congress before they will allow this material to leave their country.

If, as Mr. Palmer testified this morning that in his opinion we could become self-sufficient in the production of this important material, two things occur. First you develop the economy of the areas where this material is found, just like any other metal, or just like any factory, whether it is watches or crockery or precision instruments or textiles, or whatever it is. Secondly, you get out from under the potential blackmail by any foreign nation, and also in the case of an all-our war you can defend yourself by keeping the lines of transportation open for all of these materials.

Now this afternoon, for the first witness we are calling Mr. Johnson. Mr. Jesse Johnson is in charge of the production of raw materials, chief of raw material production, and we will ask him to explain the methods used in promoting and encouraging, on a long-range basis, the production of this important material, but not to disclose any classified material. If it becomes necessary for the committee to have this classified information, we will have an executive session probably at Washington.

But we would like to know, and I think the public is entitled to know, what arrangements are made for potential producers, what the prices are, where the price has been fixed, under what conditions and where deliveries have to be made, and where the mills are located.

The capacity of the mills may be classified material, and Mr. Johnson thoroughly understands we are asking for no information that is considered classified.

So, Mr. Johnson, if you will identify yourself for the record and just make any general statement that you care to make at the outset.

## TESTIMONY OF JESSE C. JOHNSON, DIRECTOR, DIVISION OF RAW MATERIALS, AEC

Mr. JOHNSON. My name is Jesse C. Johnson, Director of the Division of Raw Materials of the Atomic Energy Commission.

Mr. Chairman, and Senator Murray, I have no prepared statement for this hearing. I felt that the committee would want to propose questions as to the program being carried out by the Commission in the field of raw materials.

I want to say the Commission appreciates the work of this committee, and that these hearings should be extremely helpful in developing a sound and constructive policy for the development of maximum production of uranium from domestic sources.

I think at the outset that it would be desirable for me to make a few general remarks on the raw materials program. The atomic energy program over the next several years, through 1960, at least, and probably beyond, will reqire all the uranium it is possible to obtain, from domestic sources and from foreign sources, to meet the military requirements for the defense.

As you all know, the atomic energy program is of great importance in the defense of the country, and also is credited with preventing a third world war.

The objective is to develop the maximum military strength in the atomic field as soon as possible. The large plants authorized by the Congress about a year ago will require increasing amounts of uranium. Therefore, the Commission must develop the domestic production to the maximum, and that has been and continues to be the objective.

Undoubtedly we have not done everything that should have been done over the past 5 years. But I think that the committee will agree that we have steered a correct course, in leaving to the mining industry, to the miners, to the prospectors, the business of the finding and of the developing the ore deposits, and that the activities of the Atomic Energy Commission should be limited, as far as possible, to assisting industry.

I might say that the Atomic Energy Act, in reserving to the Government all of the uranium on public lands and lands owned by the Government, offered a wonderful opportunity for a Government bureau to obtain full control of this important industry. However, we established the policy that a uranium deposit could be staked the same as any other mineral deposit, even though the uranium was reserved to the Government. On that point, the Atomic Energy Act itself recognizes the value of discovery by stating that uranium produced at the will of the Government should carry a fair price, including a discovery value, cost of production, and profit.

We have, as you know under our circulars, been paying the same price for the uranium ore produced from mineral lands carrying title to the uranium as for the uranium produced from lands staked subsequent to the Atomic Energy Act on which the uranium is reserved to the Government. We make no distinction, in order words, whether the title of uranium is reserved to the Government, or in the case of earlier locations, the title is in the hands of the private owners.

In our program, which began in 1948, we attempted to revive the Colorado Plateau which had been a uranium-vanadium producer of

the past, we established a market for ores in order to stimulate mining and prospecting. At that time it was a ghost camp. We have made changes in the original price schedule; we have increased our exploration program; and we have increased the various types of assistance to the miners.

PROGRAM MOVED RAPIDLY

As pointed out in the testimony this morning, the uranium production has increased. It has expanded at an extremely rapid rate. New people have gone into the uranium business. Those that were in it before have been actively mining. Our production rates have arisen from almost nothing in 1948 until ore production today is four times the rate in the most prosperous period of the area, when the Government was subsidizing vanadium during the war.

The discoveries made in the last 12 months, the outstanding one by Mr. Sheen, and discoveries in the adjoining area by other producers, the important developments made by Mr. Cooper in the White Canyon area, discoveries in the Laguna Indian Reservation by the Anaconda, without considering the new finds out through Wyoming and Dakota, point to doubling our production within the next 2 years. I think within the next 2 years ten to twenty million dollars will be spent for additional processing plants. This program is moving ahead. The results of the discussion at this meeting here will probably bring out suggestions that will deserve serious consideration on the part of the Commission.

We have had throughout this whole program, I think, full cooperation from the miners and from the mining associations, such as the Utah Mining Association, the Colorado Mining Association, the Uranium Ore Producers Association, and others.

There have been criticisms, constructive criticisms, regarding the program. But out of these criticisms, I am sure will come and has come improvements in the program. As I mentioned, there is one objective, and one objective alone, and that is to increase the uranium production, the domestic production, in as short a time possible, with reasonable consideration for sound business and economic principles.

The recent extension of the period of guaranteed minimum prices to March 31, 1962, is a constructive move. It is recognized that it takes from 1 to 3 years to find a deposit and another year or 2 years to get into production, so that the period of guaranteed prices should not be less than 5 years and preferably more.

ACCESS ROADS IMPORTANT

Reference has been made this morning to the road program, and I hope that the Congress will continue the program of appropriating funds for access roads to mines. This has been important to uranium development during the past few years. It is becoming more important. During the earlier stages of our uranium production, that is in 1948 and 1949, work was very largely in the older districts where roads were present. They may have been bad, but they were usable. But now we are moving into new areas where roads are nonexistent. Haulage has increased as a result of increased production and better surfacing is required. I think it would be a serious setback for the

uranium industry if public funds were not available to aid in the construction and the maintenance of access roads.

Something like $4 million or $4½ million have been spent by the Federal Government in access roads for the uranium mines during the past 2 or 3 years.

On the matter of the conflict between mining claims and oil and gas leases, the legislation that this committee sponsored last spring and resulted in the passage of Public Law 250, is it Mr. Senator?

Senator MURRAY. 250, yes.

Mr. JOHNSON. This law did a great deal to clear up a serious situation. However, I don't believe it has gone far enough, and with the new locations being made in the Colorado Plateau area, and particularly out in Wyoming where much of the land is covered by oil and gas leases, it might be desirable to have that type of legislation cover future locations. It would certainly be desirable from the uranium miners' standpoint to be able to locate mining claims on public lands, even though they are covered by oil and gas leases.

The Commission has been studying the matter of issuing leases to protect those miners who have staked claims that are not valid because of conflicts with oil and gas leases. I hope we will have an announcement very shortly on a leasing arrangement which should protect the miners who stake claims on public lands covered by oil and gas leases.

We expect to offer a type of lease, not too different from the one we had last year, which covered the claims that had been staked prior to 1952. I believe it is amply proven that any AEC leases designed to protect miners who are unable to make valid locations because of prior oil and gas leases should have, as nearly as possible, the same type of requirements for staking, for work requirements, and other features, as are required under the mining laws to perfect and hold a mining location.

Now there will have to be some changes, but our effort is not to put on bureaucratic controls, but to enable the miners to operate in areas covered by oil and gas leases with minimum restrictions on the part of the Commission.

I might mention one point in regard to our buying schedules. Our ore buying schedule has a cutoff point of 0.10 percent $U_3O_8$. That is not intended to represent an economic limit for uranium ore, but a cutoff limit for ore that can be purchased under the purchase circular which is designed for specific conditions.

Low grade ores, capable of economic milling, and sufficient quantity to contribute important production, should be brought into production. Special arrangements may be negotiated. There is provision in our circular for that. To illustrate our interest in looking at all sources of uranium-bearing materials in this country, we have investigated the phosphate deposits of the West and of Florida, and production plants are being built. One plant is now in production for the recovery of byproduct uranium from phosphoric acid. We are investigating the possibility of recovering uranium from low-grade shale deposits. However, the deposits of the type that we are finding in the Colorado Plateau are more desirable because of the higher uranium content and the ability to get production quickly, in that the size of both mining and milling plant is much less per unit

of production than for very low grade materials. However, by-product recovery from fertilizer plants is only a matter of extracting the byproduct uranium from the phosphoric acid.

I think this statement may indicate our problems and objectives and I look forward to this hearing to bring out many ideas that will assist us.

Mr. Chairman, I think further testimony on this might be developed as the result of questions.

As I understand, there is nothing classified about the production, or milling, and purchase price per unit, and how it is determined.

PURCHASING

Mr. JOHNSON. The method of purchasing, Mr. Chairman, was patterned in a general way after arrangements that were made during the war when purchasing depots for the purchase of tungsten ores, chrome ores, manganese ores were established. The schedule of prices with various allowances and bonuses have provided a market for the ore produced by the independent miners. The purchase schedules apply to the ore-buying stations and mills operated by the Commission. However, the privately operated mills must pay the same price as that specified in our schedule, or prices not less than those in the schedule.

The price now paid for uranium content in ore ranges from $2 a pound for ore containing 0.1 percent $U_3O_8$, and that includes the 50 cents development allowance, to $4 a pound for ores containing 0.2 of 1 percent. There also are premiums for higher grade ores. Rather than read these price schedules, I suggest that we put them in the record.

Senator MURRAY. Mr. Chairman, can I ask a question right there?

The CHAIRMAN. Certainly. Go ahead.

Senator MURRAY. I wish you would give us an illustration now how a miner producing uranium in Montana would handle his shipments. Where would he dispose of them?

Mr. JOHNSON. A shipper in Montana, a producer in Montana, would have to make special arrangements with the Commission in order to ship small quantities of ore because of the lack of ore-buying stations in Montana.

If the supply became large enough to justify an ore-buying station in Montana, one would be set up. The shipments that have been made so far from Montana have been shipped here to Salt Lake, to the Vitro plant.

The CHAIRMAN. Is that a Government agency?

Mr. JOHNSON. No, sir; that is a privately owned plant.

Senator MURRAY. Is the Atomic Energy Commission represented there so that they could check their assays to determine whether or not the shipper is getting his full value?

Mr. JOHNSON. The assays are subject to umpire. The sampling at Salt Lake is done by the Utah Sampling Works, which is an old and established firm in handling customs ores into the mills.

Senator MURRAY. Then every shipment goes through this sampling process that you mention?

Mr. JOHNSON. That is my understanding of that; correct.

Senator MURRAY. I just got a telephone call from Montana at the noon hour, in which shippers there are complaining they have shipped their ore here into this Salt Lake concern and then after that it is shipped down to Colorado some place, Grand Junction, I believe, or some place like that, and they feel that they are not getting full value for their shipments, that the Atomic Energy Commission should have someone in the plant there to determine whether or not they are getting their proper value for their shipments.

Mr. JOHNSON. I am not familiar with the details of the operation, Senator Murray, but it is the first time that I have heard any complaint on that arrangement. Mr. Wimpfen confirms that the ore shipped to Vitro is sampled by the Utah Sampling Works, which is an old established firm, entirely independent of the buyer or seller.

Senator MURRAY. Other than that, is their ore shipped direct to the Utah Sampling Works which has such a fine reputation?

Mr. JOHNSON. It is shipped directly there; yes, sir.

Senator MURRAY. A pulp sample is furnished? These people tell me on the phone that their shipment was to the Vitro Co.

Mr. JOHNSON. The Vitro Chemical Co. operates a plant here in Salt Lake City, but the sampling is done before the ore is sent to the Vitro plant. It is done at the Utah Sampling Works.

Senator MURRAY. And the shipper then is supplied with a report from the Utah Sampling Works showing the assay on their shipment?

Mr. JOHNSON. I believe that the shipper is furnished a pulp sample which he may have independently assayed, and the sample is also analyzed, assayed by the Vitro Chemical Co. If there is a dispute in sampling, it would go to umpire.

Senator MURRAY. I see.

Mr. JOHNSON. This is the standard practice in the mining industry.

Senator MURRAY. Well, these people that called me on the phone seemed to think that the Government should have someone at the Salt Lake institution that would be able to guarantee them that they are getting their proper value for their shipments.

Mr. JOHNSON. Well, I assure you we will look into it, Senator Murray, and attempt to see that the shipper is satisfied in the way his ore is handled.

Senator MURRAY. They have got to have confidence in the fact that they are getting the correct value for the material, or else they will not be interested in shipping it. If they get to thinking they are not being treated fairly, they probably will not continue to produce, but if they are encouraged by a feeling that they are going to be given full value, they will go forward and try to develop more. Now, Montana is one of the first States that began to develop uranium.

Mr. JOHNSON. That is right.

Senator MURRAY. I remember being there at a mine in Boulder where the ore was being developed, and I brought samples of it myself back to Washington to the Atomic Energy Commission, and had it assayed, and I found out that it was a low grade, but nevertheless they gave us the information that it was very interesting, and that they should continue their exploration with the thought that it may develop into something bigger, and there have been a number of small developments of that kind in Montana, but they are mostly low grade, I believe. However, we hope that as they continue their exploration that they may discover some very substantial deposits.

Mr. JOHNSON. We certainly are hopeful, and have had both the United States Geological Survey and Atomic Energy people in there. There are some drilling and assistance programs under way to assist those miners.

Senator MURRAY. I would like to give you the names of these people, after receipt, and bring to you so that you could contact them. Well, one of these men is Mr. Eislin in Boulder, and the other is Mr. Milligan at Boulder. There is a third man. I don't know his name, or their first names.

The CHAIRMAN. All of Montana?

Senator MURRAY. All of Montana.

Mr. JOHNSON. At Boulder?

Senator MURRAY. Yes, Boulder, Mont. And the mine is right there at Boulder, Mont. I will see them when I get to Butte, and will go over there, meet with them, and probably correspond with you again.

Mr. JOHNSON. Fine. Thank you.

Senator MURRAY. I think that is all.

The CHAIRMAN. That is very constructive questioning, Senator Murray, because it is just those kind of men that are going to find this uranium and produce it in the first instance, if it is found.

Mr. Johnson, I would like to determine which of these releases prevail at this time? I have one release dated the 26th of February 1951, but I note in a table that 0.10 is listed at $1.50. That does not quite confirm.

Mr. JOHNSON. That is correct. I said $1.50 with the 50 cents development allowance. Now you will note on here that allowances, under 3 on the last page:

A development allowance of $0.50 per pound $U_3O_8$ contained in ores assaying 0.10 percent $U_3O_8$ or more in recognition of the expenditures necessary for maintaining and increasing developed reserves of uranium ores.

The CHAIRMAN. This sheet will appear at this point in the record as a part of Mr. Johnson's testimony. It is entitled "Title 10—Atomic Energy, Chapter 1, Atomic Energy Commission (Domestic Uranium Program Circular 5, Revised)."

ATOMIC ENERGY COMMISSION: TITLE 10—ATOMIC ENERGY

CHAPTER 1—ATOMIC ENERGY COMMISSION

(Domestic Uranium Program Circular 5, Revised)

PART 60—DOMESTIC URANIUM PROGRAM—GUARANTEED MINIMUM PRICE FOR URANIUM-BEARING CARNOTITE-TYPE OR ROSCOELITE-TYPE ORES OF COLORADO PLATEAU AREA

Section 60.5 and section 60.5a of title 10, Code of Federal Regulations, are amended by increasing the prices and premiums to be paid after March 1, 1951, for uranium ores, so that section 60.5 and section 60.5a, as amended, shall read as follows:

Section 60.5 *Guaranteed minimum price for uranium-bearing carnotite-type or roscoelite-type ores of the Colorado Plateau area*—(a) *Guarantee.* To stimulate domestic production of uranium-bearing ores of the Colorado Plateau area, commonly known as carnotite-type or roscoelite-type ores, and in the interest of the common defense and security, the United States Atomic Energy Commission hereby establishes the guaranteed minimum prices specified in section 60.5a effective during the period March 1, 1951, through March 31, 1962, for the delivery of such ores to the Commission at Monticello, Utah, in accordance with the terms of this section and section 60.5a.

NOTE.—In sections 60.1 and 60.2 (Domestic Uranium Program, Circulars No. 1 and 2), the Commission established guaranteed prices for other domestic uranium-bearing ores, mechanical concentrates, and refined uranium products.

(b) *Effect on sections 60.3 and 60.3a.* Sections 60.3 and 60.3a, which also apply to carnotite and roscoelite ores, are not revoked by the issuance of this section and section 60.5a and sellers may elect to deliver ore under the provisions of sections 60.3 and 60.3a rather than under this section and 60.5a, at their option, during the unexpired terms of sections 60.3 and 60.3a (through April 11, 1951). It is believed, however, that in most cases the provisions of this section and section 60.5a will be more favorable to producers.

(c) *Definitions.* As used in this section and in section 60.5a, the term "buyer" refers to the United States Atomic Energy Commission, or its authorized purchasing agent. The term "ore" does not include mill tailings or other mill products. The term "seller" refers to any person offering uranium ores for delivery to the Commission. Weights are avoirdupois dry weights, unless otherwise specifically provided.

(d) *Deliveries of not to exceed 1,000 tons per year.* To aid small producers, any one seller may deliver without a written contract but otherwise in accordance with this circular up to, but not exceeding 1,000 short tons (2,000 pounds per ton) of ores during any calendar year.

(e) *Deliveries in excess of 1,000 tons per year.* Sellers desiring to deliver in excess of 1,000 short tons (2,000 pounds per ton) of ores during any calendar year will be required to enter into a contract with the Commission providing for, among other things, a rate of delivery and the total quantity of ore to be delivered.

(f) *Delivery.* Seller, at his own expense, shall deliver and unload all ores at the buyer's depot at Monticello, Utah. Deliveries shall be in lots of not less than 10 short tons (2,000 pounds per ton) unless special arrangements have been agreed upon by buyer, but such lots may be delivered in more than one load. Days and hours during which ore may be delivered will be posted at the depot.

(g) *Weighing, sampling, and assaying.* Buyer will bear the cost of weighing, sampling, and assaying. The net weight of each load will be determined by the buyer's weighmaster on scales which will be provided by the buyer at or in the vicinity of the purchase depot and such weight will be accepted as final. A weight ticket will be furnished seller or his representative for each load. Each lot of ores will be sampled promptly by the buyer according to standard practice and such sampling will be accepted as final. Seller or his representative may be present at the sampling at his own expense. The absence of seller or his representative shall be deemed a waiver of this right. Buyer will make moisture determinations, according to standard practices in ore sampling. All final samples will be divided into four pulps and distributed as follows: (1) The seller, or his representative, will receive one pulp; (2) the buyer will retain one pulp; (3) the other two pulps will be reserved for possible umpire analysis. The buyer's pulp will be assayed by the buyer. The seller may, if he desires, and at his own expense, have his pulp assayed by an independent assayer. In case of disagreement on assays as to any constituent of the ores, an umpire shall be selected in rotation from a list of umpires approved by the buyer whose assays shall be final if within the limits of the assays of the two parties; if not, the assay which is nearer to that of the umpire shall prevail. The party whose assay is the farther from that of the umpire shall pay the cost of the umpire's assay for the constituent of the ores which is in dispute. In the event that the umpire's assay is equally distant from the assay of each party, costs will be split equally. In case of seller's failure to make or submit assays, buyer's assays shall govern. After sampling, the ores may be placed in process, commingled, or otherwise disposed of by buyer.

(h) *Payment.* Buyer will make payment promptly but payment will not be made until an entire minimum lot of ten short tons (2,000 pounds per ton) has been delivered and accepted, unless special arrangements have been agreed upon by buyer, in which case there may be an extra charge for assaying and sampling. Moisture determinations, analyses and settlement sheets, together with the check in payment, will be mailed to seller.

(i) *Inquiries.* All inquiries concerning the provisions of this section and section 60.5a, offers to deliver ores, or questions about the Commission's domestic uranium program in the Colorado Plateau area should be addressed to:

United States Atomic Energy Commission, Post Office Box 270, Grand Junction, Colorado; Telephone: Grand Junction 3000.

(j) *Licenses.* Arrangements will be made by the Commission for the issuance of licenses, pursuant to the Atomic Energy Act of 1946, covering deliveries of source material to the Commission under this section and section 60.5a.

(k) *Limitation of commitment.* Commitments by the Commission to accept delivery of ores are limited to the provisions of this section and section 60.5a as amended from time to time, or to written contracts between the Commission and sellers. Other commitments purporting to be made by the Commission's field personnel or other agents of the Commission will not bind the Commission unless they are in accord with the provisions of this section and section 60.5a or other official circulars.

Section 60.5a. *Schedule I; minimum prices, specifications, and conditions*—(a) *Prices.* Payment for delivery of the ores will be computed on the following basis:

(i) *Uranium.* (1) Ores assaying less than 0.10 percent: no payment. Any such ores which are delivered to the purchase depot shall, unless otherwise specifically agreed to by buyer, become the property of the buyer as liquidated damages for buyer's expense of weighing, sampling, and assaying, and after sampling may be placed in process, commingled, or otherwise disposed of by buyer. If seller has any question as to the quality of his ore, it is suggested that before shipment and delivery to the purchase depot a representative sample be submitted to the buyer or to one of the umpires for assay at seller's expense. The buyer at its discretion may assay a limited number of samples without charge.

(ii) Ores assaying 0.10 percent $U_3O_8$ and more, as follows:

| $U_3O_8$ assay: | *Payment per pound $U_3O_8$* |
|---|---|
| 0.10 percent | $1.50 |
| 0.11 percent | 1.70 |
| 0.12 percent | 1.90 |
| 0.13 percent | 2.10 |
| 0.14 percent | 2.30 |
| 0.15 percent | 2.50 |
| 0.16 percent | 2.70 |
| 0.17 percent | 2.90 |
| 0.18 percent | 3.10 |
| 0.19 percent | 3.30 |
| 0.20 percent and more | 3.50 |

(iii) Premiums on uranium: $0.75 per pound for each pound of $U_3O_8$ in excess of 4 pounds of $U_3O_8$ per short ton (2,000 pounds per ton) of ore and an additional premium of $0.25 per pound for each pound in excess of 10 pounds $U_3O_8$ per short ton. Fractional parts of a pound will be paid for on a pro rata basis to the nearest cent.

(2) *Vanadium.*—$V_2O_5$ at $0.31 per pound up to, but not exceeding, 10 pounds of $V_2O_5$ for each pound of $U_3O_8$ contained in ores. No factor will be included for $V_2O_5$ in excess of 10 pounds for each pound of $U_3O_8$ although buyer may, from time to time, publicly announce that, for limited periods by written agreements with individual producers, $V_2O_5$ in excess of 10 to 1 will be paid for. Any such announcement will be made by posting a notice to this effect at the Monticello depot and through such other channels as are deemed suitable to achieve maximum dissemination among producers. Excess $V_2O_5$ shall be deemed to be buyer's property.

(3) *Allowances.*—(1) A development allowance of $0.50 per pound $U_3O_8$ contained in ores assaying 0.10 percent $U_3O_8$ or more in recognition of the expenditures necessary for maintaining and increasing developed reserves of uranium ores. Fractional parts of a pound will be paid for on a pro rata basis to the nearest cent. Sellers accepting this allowance are deemed to agree to spend such funds for the development of exploration of their properties. Sellers delivering less than 1,000 short tons per calendar year will not be required to submit an accounting record of expenditures for development or exploration pursuant to this agreement but sellers delivering in excess of 1,000 short tons per calendar year will be required, under the terms of their contracts, to submit proof satisfactory to the Commission that funds equivalent to the amount received as development allowance have been spent for development or exploration either during the contract period or within 6 months thereafter, unless otherwise provided in the contract.

(ii) A haulage allowance of 6 cents per ton-mile for transportation of ore paid for under sections 60.5 and 60.5a from the mine where produced to the purchase depot specified by the Commission, up to a maximum of 100 miles. The haulage distance from the mine to the purchase depot will be determined by the Commission and its decision will be final. Tonnages for purposes of this allowance shall be calculated on the basis of natural weights rather than dry weights.

(4) *Adjustment of assays.*—Assays shall be adjusted to the nearest 0.01 percent for purposes of payment.

(b) *Quality and size.*—Ores will not be accepted by buyer under Sections 60.5 and 60.5a which, in buyer's judgment:

(1) Contain less than 0.10 percent $U_3O_8$

(2) Contain more than three parts of lime ($CaCO_3$) to one part of $V_2O_5$, or a total of more than 6 percent lime in the ore;

(3) Contain impurities deleterious to buyer's extraction process or for any other reason are not amenable to it:

(4) Contain lumps in excess of 12 inches in size.

NOTE.—The Commission will be interested in discussing arrangements for delivery to it of types of uranium-bearing materials other than those for which guaranteed prices have been established, such as tailings, mill products, and ores of types not acceptable under sections 60.5 and 60.5a.

(60 Stat. 755–775; 42 U. S. C. 1801–1819. Interpret or apply sec. 5, 60 Stat. 761, 42 U. S. C. 1805.)

Effective March 1, 1951 through March 31, 1958.

Dated at Washington, D. C., this 26th day of February 1951.

By order of the Commission.

M. W. BOYER,
*General Manager.*

(F. R. Doc. 51-3190; Filed, Mar. 12, 1951; 8:45 a. m.)

HAULAGE ALLOWANCE

Mr. JOHNSON. One allowance contained in that circular is a haulage allowance of 6 cents per ton-mile for transportation of the ore from the mine of the producer to the purchase depot where it is sold, up to a maximum distance of 100 miles. The purpose of that is to defray a major part of the cost of trucking the ores from the mines to the mills.

The CHAIRMAN. What do you think the actual cost of trucking ores amounts to under present conditions? I understand that you are not intending to pay all of the cost, but what do you consider, from your knowledge of the situation out here, that the cost really amounts to on an average? Naturally it would be different in different areas.

Mr. JOHNSON. It is quite different, Mr. Chairman, for different roads and different distances. For a short distance of only 4 or 5 miles, the cost per mile of trucking will be probably quite high.

The CHAIRMAN. For example?

Mr. JOHNSON. Loading and unloading trucks takes considerable time. Hauling over a long distance on good roads, the trucking allowance of 6 cents per mile probably about covers it. In some cases the contracts may be a little less than that. Over bad roads the contract prices may be 7, 8, or 9 cents per mile, and in some cases even higher. I would like to call on Mr. Wimpfen, if I might, to supply an estimate of an average figure.

Mr. SHELDON WIMPFEN. If we are going to try to put an average on it, I would say it is about 8 cents a mile. If I were to attempt to put an average on the actual cost per ton-mile for truck hauling, I would say it would be between 8 and 10 cents per ton-mile, but as Mr. Johnson pointed out there is a wide range of variation, and there are a

number of instances where we know that the actual costs incurred for hauling are actually less than the allowance of 6 cents.

The CHAIRMAN. Let's get down to the basis here, suppose you have a 6- to 10-mile haul over mountain roads, just a good dirt road. What kind of bids would you expect to receive if you were trying to get hauling bids?

Mr. WIMPFEN. It would probably be in excess of 10 cents by reason of the time incurred in loading the trucks and the very short haul, and the time incurred in unloading.

The CHAIRMAN. How much in excess of 10 cents, 12 cents, 15 cents?

Mr. WIMPFEN. Probably about 14 cents.

The CHAIRMAN. For a 25-mile haul, maybe half of it over mountain roads. Let's see what you think the cost per ton-mile would be if you were receiving bids.

Mr. WIMPFEN. How long a distance?

The CHAIRMAN. Twenty-five miles.

Mr. WIMPFEN. There again you would have a range. On the Uncompaghre——

The CHAIRMAN. Let's find out. Take a road, half an ordinary dirt mountain road, and the rest on some other kind.

Mr. WIMPFEN. It will probably be between 8 and 10 cents.

The CHAIRMAN. That is good. Go ahead, Mr. Johnson.

Mr. WIMPFEN. I might, with your permission, Mr. Chairman, attempt to clarify this question relating to Senator Murray's people in Montana. The actual manner of handling those ores is that the Commission negotiates a contract with the producer through the agency of the American Smelting & Refining Co., which acts as ore buying agent for the Commission for these places where no ore-buying stations exist. This contract calls for the payment of the actual railroad freight haul between the point where the material is loaded onto freight cars and discharged at the point of sampling. The ores purchased under such an agreement, where no sampling facilities exist, a so-called branch area, ore contracts must have a certain minimum grade to make the thing economic.

At the same time we have negotiated a contract with the Vitro Chemical Co. whereby they procure the ores from us in exchange for complete reimbursement on the basis of the costs we have incurred. A split of the sample not only goes to the producer of the ore and to the Vitro Chemical Co., which is the eventual purchaser of the ore here in Salt Lake City, but the Commission also gets a pulp so it can assay the pulp and confirm that the producer is getting a fair shake and an accurate assay.

Senator MURRAY. Is the Vitro Co. a Government agency?

Mr. WIMPFEN. No, sir; it is an independent segment of private enterprise.

Senator MURRAY. How is it necessary for that firm to come into the picture?

Mr. WIMPFEN. They want the ores to process them, because they have a contract with the Commission for disposal of their uranium concentrates to the Commission.

Senator MURRAY. It is to their interest then to get the ore at the lowest possible cost to them, and then to sell it to the Commission at the best price they can secure, so as to help them make a profit on the transaction?

Mr. WIMPFEN. That is correct.

Mr. JOHNSON. This is the point, Senator Murray, the purchase price is the price established by the Commission in the public buying circular, and that is the price that is paid to the producer, so he gets the price whether he sells it to a privately operated mill or to a Commission buying station.

Senator MURRAY. I see.

Mr. JOHNSON. Now, in order to take care of these situations in Montana and elsewhere where small production has been developed, but not sufficient yet to pay the Commission to put in a buying station, we are buying the ore, arranging the contracts so that the producer loads the ore on railroad cars, and gets his haulage allowance from the mine to the railroad cars, and we are absorbing the railroad freight until such time as we can develop enough production up there in the local area to put in a Commission ore-buying station.

Senator MURRAY. So that the producer has the transportation charges assumed by the Atomic Energy Commission, so they get the full amount of the value of their ore as it comes to you?

Mr. JOHNSON. That is essentially correct. In other words, the haulage charge, the haulage cost from the mine to our buying station or mill, the trucking and freight is covered in part by the haulage allowance, but where it is uneconomic to put in a buying station we accept the ore on board railroad cars. However, if there is any production of any consequence developed, we put in a buying station, such as Edgemont. The same is true of the Marysvale area.

Senator MURRAY. Do you know whether or not you are getting any shipments from Montana at this time?

Mr. WIMPFEN. Yes, sir; I do know. They are very small amounts that don't amount to more than several hundred tons a month.

Senator MURRAY. I knew it was a small production, but I was wondering if it was developing.

Mr. WIMPFEN. No, sir; there have not been substantial reserves developed as yet. We greatly hope this method of encouragement, by improving the market, by absorbing the freight haul, will in the long run tend to develop more reserves.

The CHAIRMAN. Thank you, Senator Murray.

### PRODUCTION BONUS

Mr. JOHNSON. Mr. Chairman, I would also like to put in the record the circular covering bonus for initial production of uranium ores from domestic mines. That initial production bonus applies to the first 10,000 pounds of uranium oxide content of ore produced from any new mine, and it is double the base price for the ore, as contained in the buying circular. If an ore contains .2 of 1 percent uranium, the base price is $3.50 a pound. The producer gets another $3.50 under the initial production bonus for the first 10,000 pounds in ore shipped from a new mine. Also, if a mine had produced some ore prior to the issuance of this circular he would be entitled to a bonus upon the difference between the amount shipped prior to the bonus schedule and 10,000 pounds. In other words, if a small mine had produced 3,000 pounds and may have closed down, when it started up again it would be entitled to a bonus on 7,000 pounds under this bonus production schedule.

The idea in this is to attempt to give the new producer a special benefit in order to assist him in the development expenses in opening up the new mine, and building roads and camps, and also to enable a prospector to make better returns in following a low-grade deposit until such time as it might develop into a better grade deposit.

The CHAIRMAN. Mr. Johnson, you are familiar with the schedule of prices of carnotite and roscoelite uranium ores which you have published, which includes all the basic prices?

Mr. JOHNSON. I am not familiar with that particular schedule.

The CHAIRMAN. Will you examine it and see if it is correct?

Mr. JOHNSON. This is the one issued by our Grand Junction office.

Mr. WIMPFEN. We published this.

Mr. JOHNSON. Yes, this is the schedule that contains the calculations involved in applying the schedules contained in the published circulars.

The CHAIRMAN. That sheet, at this point, will be accepted in the record to appear as part of Mr. Johnson's testimony.

(Material furnished by Mr. Johnson and asked by him to be incorporated in the record.)

TITLE 10—ATOMIC ENERGY

CHAPTER 1—ATOMIC ENERGY COMMISSION

(Domestic Uranium Program Circular 6)

PART 60—DOMESTIC URANIUM PROGRAM BONUS FOR INITIAL PRODUCTION OF URANIUM ORES FROM DOMESTIC MINES

Section 60.6. *Bonus for initial production of uranium ores from new domestic mines*—(a) *What this section does.* This section provides for bonus payments for initial and certain other production of uranium-bearing ores. It is intended to encourage and assist the development of new sources of domestic uranium production in the interest of the common defense and security.

(b) *Production bonus established.* The U. S. Atomic Energy Commission will pay a bonus under the conditions set forth in this section for delivery to a Commission ore-buying station or a qualified uranium mill (hereafter called station or mill) of uranium ores from an eligible mining property up to the maximum quantities specified in this section.

(c) *Term of this section.* This section will apply to deliveries made under its terms between March 1, 1951, and February 28, 1952, inclusive.

(d) *Payment of the bonus.* Bonus payments will be computed on the following basis:

Ores assaying less than 0.10 percent $U_3O_8$: no payment.

Ores assaying 0.10 percent $U_3O_8$ and more, as follows:

| $U_3O_8$ assay: | *Payment per pound of $U_3O_8$* |
|---|---|
| 0.10 percent | $1.50 |
| 0.11 percent | 1.70 |
| 0.12 percent | 1.90 |
| 0.13 percent | 2.10 |
| 0.14 percent | 2.30 |
| 0.15 percent | 2.50 |
| 0.16 percent | 2.70 |
| 0.17 percent | 2.90 |
| 0.18 percent | 3.10 |
| 0.19 percent | 3.30 |
| 0.20 percent and more | 3.50 |

Fractional parts of a pound will be paid for on a pro rata basis to the nearest cent. Assays will be adjusted to the nearest 0.01 percent for purposes of payment. Weights are avoirdupois dry weight. Bonus payments made under this section will be in addition to any other payments for delivery of the ore. They will be paid directly by the Commission and not by the station or mill.

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(e) *Maximum quantity of uranium ores for which bonus payments will be made.* Subject to the conditions of this section, bonus payments will be made on deliveries of uranium ore from an eligible mining property to a station or mill until bonus payments have been made on 10,000 pounds of contained uranium oxide less the number of pounds, if any, accepted by stations or mills (or any other uranium ore processing plants) from that mining property between April 9, 1948 and February 28, 1951, inclusive.

(f) *Ores for which bonus payments will be made.* Ores for which bonus payments will be made must have been delivered to and paid for by either a station or mill. However, in special cases, bonus payments may be made for ores which have been accepted by the station or mill but for which payment is still pending. Bonus payments will not be made for ores which a station or mill refuses to accept. The weights and final assays made to ascertain the amount of payment due from the station or mill shall be used to determine the amount of bonus payments under this section.

(g) *Which mining properties are eligible.* In order for a mining property to be eligible for bonus payments under this section,

(1) As required by paragraph (e) of this section, the total quantity of uranium oxide as contained in ore accepted by stations or mills (or any other uranium ore processing plants) from that property between April 9, 1948, and February 28, 1951, inclusive, must have been less than 10,000 pounds; and

(2) The property must be within the United States, its territories, possessions or the Canal Zone; and

(3) The property must be certified by the Commission as eligible using the following criteria as guides:

(i) *Purpose of the bonus.* The purpose of the bonus is to encourage and assist the development of new sources of domestic uranium production.

(ii) *Character of mining property.* The mining property may consist of a placer or lode location, or if not covered by location, a tract which the Commission finds to be comparable or otherwise appropriate. However, an entire holding consisting of contiguous locations or tracts will be regarded as only a single eligible unit of mining property if the locations or tracts are held in common in the manner set forth in the following paragraph.

(iii) *Title or interest of the holder of the property.* The title or interest in the mining property should be one of ownership or lawful possession of mining rights. This type of holding will generally be that of an owner or leaser (lessee). It is recognized that there are various arrangements such as split check leases, piece-rate contracts and the like whereby persons either as employees or independent contractors conduct mining operations on designated areas of property held by another who also supplies certain of the mining services or equipment or both and who receives in return a percentage of the proceeds of the ore produced. In the case of such arrangements, the person who grants the right to conduct these mining operations will be considered as the holder of the mining property although others perform mining operations on it.

(iv) *Minimum size of mining property.* The mining property, if it is made up of a location or locations, should contain at least 15 acres. The minimum size of lands on Indian reservations will be established by the Commission after consultation with the Bureau of Indian Affairs of the Department of Interior. The minimum size of other mining properties will be established by the Commission in individual cases in the light of the purpose of the bonus.

(v) *Subdivision or consolidation of property.* Since the division of existing mining properties into smaller units might have the effect of increasing bonus payments without advancing the purpose of the bonus program, division of a single unit of mining property on or after March 1, 1951, will not be recognized in determining its eligibility for bonus payments under this section. In addition, consolidation or merger of contiguous mining properties on or after March 1, 1951, will not affect the eligibility of the separate properties for bonus payments.

(vi) *Special cases.* Since the above criteria are merely guides to assist the Commission in its decisions, areas which fail to meet all of the criteria may be certified by the Commission as eligible in special cases where it is determined that the deviations are not substantial or that their disqualifications would cause serious inequities. In determining whether or not serious inequities would result, the physical characteristics and location of the deposit may be a factor. Under appropriate circumstances, a segment of a certified property

may itself be certified as eligible. On the other hand, technical compliance with all the above criteria will not necessarily make a property eligible.

Properties leased to private operators by the Commission will not be eligible for bonus payments except under special circumstances and as provided for in the lease.

(h) *Determination by the Commission.* The Commission expressly reserves the right to decide the amount of any bonus payments to be made, whether the property should be certified as an eligible mining property, the person to whom the bonus should be paid and whether for any reason a bonus is not payable. These decisions shall rest in the sole discretion of the Commission and shall be final and conclusive. The Commission further reserves the right to establish procedures to carry out the bonus program. Any bonus payments made hereunder with respect to particular ores shall be the only such bonus payments made for those ores. The Commission will not consider any other application for bonus payments on those ores.

(i) *Application for certification.* Applications for certification of a property as eligible should be made to: U. S. Atomic Energy Commission, Colorado Raw Materials Office, P. O. Box 270, Grand Junction, Colorado.

The application should include a description of the mining property indicating its size, location, ownership, interest of the applicant, and public recording. There should also be included a statement by the applicant that to the best of his knowledge the total quantity of uranium oxide contained in ore accepted by stations or mills (or any other uranium ore processing plants) from that property between April 9, 1948 and February 28, 1951, inclusive, was less than 10,000 pounds. A form prescribed by the Commission and obtainable at a station or mill should be used for supplying the above information. Certification by the Commission will be a prerequisite to payment of the bonus, but after certification, payments will be made for ores which are delivered before certification and which meet the requirements of this section. Normally certification will not be made before uranium deposits have been discoveerd on the property, but the Commission may issue certifications prior to discovery in special cases. The Commission reserves the right to revoke a certification if it determines that its issuance was based on fraud, misrepresentation, or mistake or if the requirements of this section are not complied with. The Commission may require such information and right to make such inspections of the mining property as it finds necessary for the purpose of determining its eligibility for bonus payments and the amounts to be paid.

NOTE.—Misrepresentation or falsification of facts in an application for certification or for bonus payments may subject the offender to criminal penalties under pertinent provisions of the United States Code including section 1001 of Title 18. Any such offenses also will disqualify the offender from receiving bonus payments.

(j) *Application for bonus payment.* Application for a bonus payment should be made on a prescribed form (obtainable at a station or mill) at intervals not more frequent than once a month during a period when ore deliveries from the property are believed to meet the requirements of this section. Applications may be addressed as follows: U. S. Atomic Energy Commission, Colorado Raw Materials Office, P. O. Box 270, Grand Junction, Colorado.

In addition to the application, the Commission may require such other information as it finds necessary.

(k) *Who may apply for bonus payments.* The person (other than a royalty payee or the like) who has lawfully received payment from a station or mill for the delivery of ore from a certified mining property may apply for bonus payments under this section. However, in special cases, the applications of persons whose ores have been accepted by the station or mill but for which payment is still pending will be considered.

(l) *Mill processing ores from its own mines.* In the event that an operator of a mill processes in the mill ores which it obtains from mining properties operated by it, the Commission will pay the bonus under the conditions set forth in this section to the same extent as if the mining properties were operated by another person who delivered ore to the mill and received payment for it from the mill. In such case, however, the weights and assays used to fix the amount of payment due as a bonus under this section shall be determined in accordance with practices satisfactory to the Commission.

(m) *Definitions.* As used in this section.

(1) "Commission" means the Atomic Energy Commission created by the Atomic Energy Act of 1946, or its duly authorized representative.

(2) "Person" means any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, or combination thereof. The term "person" shall not include the U. S. or any agency thereof or any officer or employee of the Commission.

(n) *Commission ore-buying stations and qualified uranium mills.*—(1) *Stations.* The following are Commission ore-buying stations (that is, ore-buying stations operated on behalf of the Commission):

American Smelting & Refining Co., Monticello, Utah.
American Smelting & Refining Co., Marysvale, Utah.

(2) *Mills.* The following are qualified uranium mills:

United States Vanadium Company, Uravan, Colo.
United States Vanadium Company, Rifle, Colo.
Climax Uranium Co., Grand Junction, Colo.
Vanadium Corporation of America, Durango, Colo.
Vanadium Corporation of America, Naturita, Colo.
Vanadium Corporation of America, Hite, Utah.
Vitro Chemical Co., 600 West 33d St. South, Salt Lake City, Utah.

(3) *Modifications.* These lists may be modified from time to time by public announcement of the Commission.

(o) *Inquiries and communications.* Inquiries about this section and all other communications should be addressed as follows: U. S. Atomic Energy Commission, Colorado Raw Materials Office, P. O. Box 270, Grand Junction, Colo.

(p) *Records, rules and regulations.* The Commission may require applicants for bonus payments under this section to keep for Commission inspection such records concerning production and deliveries of uranium ores for which application is made as it finds proper and may issue such additional rules and regulations relating to bonus payments as it finds necessary or desirable.

(60 Stat. 755–775; 42 U. S. C. 1801–1819.)

Dated at Washington, D. C., this 27th day of June 1951.

By order of the Commission.

M. W. BOYER,
*General Manager.*

(F. R. Doc. 51–7522; Filed June 29, 1951; 8:53 a. m.)

(The following schedule was ordered to be incorporated into the record by the chairman:)

*Schedule of prices for uranium ore (carnotite or roscoelite type uranium ores)*

| Percent $U_3O_8$ | Pounds $U_3O_8$ | Base price | | Premium | | Development allowance, 50 cents per pound | Price before initial production bonus and haulage allowance | Initial production bonus (10,000 pounds) | Price before haulage allowance |
|---|---|---|---|---|---|---|---|---|---|
| | | Pound $U_3O_8$ | Ton of ore | 75 cents per pound, 4 pounds plus | 25 cents per pound, 10 pounds plus | | | | |
| 0.10 | 2.00 | $1.50 | $3.00 | | | $1.00 | $4.00 | $3.00 | $7.00 |
| 0.11 | 2.20 | 1.70 | 3.74 | | | 1.10 | 4.84 | 3.74 | 8.58 |
| 0.12 | 2.40 | 1.90 | 4.56 | | | 1.20 | 5.76 | 4.56 | 10.32 |
| 0.13 | 2.60 | 2.10 | 5.46 | | | 1.30 | 6.76 | 5.46 | 12.22 |
| 0.14 | 2.80 | 2.30 | 6.44 | | | 1.40 | 7.84 | 6.44 | 14.28 |
| 0.15 | 3.00 | 2.50 | 7.50 | | | 1.50 | 9.00 | 7.50 | 16.50 |
| 0.16 | 3.20 | 2.70 | 8.64 | | | 1.60 | 10.24 | 8.64 | 18.88 |
| 0.17 | 3.40 | 2.90 | 9.86 | | | 1.70 | 11.56 | 9.86 | 21.42 |
| 0.18 | 3.60 | 3.10 | 11.16 | | | 1.80 | 12.96 | 11.16 | 24.12 |
| 0.19 | 3.80 | 3.30 | 12.54 | | | 1.90 | 14.44 | 12.54 | 26.98 |
| 0.20 | 4.00 | 3.50 | 14.00 | | | 2.00 | 16.00 | 14.00 | 30.00 |
| 0.21 | 4.20 | 3.50 | 14.70 | $0.15 | | 2.10 | 16.95 | 14.70 | 31.65 |
| 0.22 | 4.40 | 3.50 | 15.40 | .30 | | 2.20 | 17.90 | 15.40 | 33.30 |
| 0.23 | 4.60 | 3.50 | 16.10 | .45 | | 2.30 | 18.85 | 16.10 | 34.95 |
| 0.24 | 4.80 | 3.50 | 16.80 | .60 | | 2.40 | 19.80 | 16.80 | 36.60 |
| 0.25 | 5.00 | 3.50 | 17.50 | .75 | | 2.50 | 20.75 | 17.50 | 38.25 |
| 0.26 | 5.20 | 3.50 | 18.20 | .90 | | 2.60 | 21.70 | 18.20 | 39.90 |
| 0.27 | 5.40 | 3.50 | 18.90 | 1.05 | | 2.70 | 22.65 | 18.90 | 41.55 |
| 0.28 | 5.60 | 3.50 | 19.60 | 1.20 | | 2.80 | 23.60 | 19.60 | 43.20 |
| 0.29 | 5.80 | 3.50 | 20.30 | 1.35 | | 2.90 | 24.55 | 20.30 | 44.85 |
| 0.30 | 6.00 | 3.50 | 21.00 | 1.50 | | 3.00 | 25.50 | 21.00 | 46.50 |
| 0.31 | 6.20 | 3.50 | 21.70 | 1.65 | | 3.10 | 26.45 | 21.70 | 48.15 |
| 0.32 | 6.40 | 3.50 | 22.40 | 1.80 | | 3.20 | 27.40 | 22.40 | 49.80 |
| 0.33 | 6.60 | 3.50 | 23.10 | 1.95 | | 3.30 | 28.35 | 23.10 | 51.45 |
| 0.34 | 6.80 | 3.50 | 23.80 | 2.10 | | 3.40 | 29.30 | 23.80 | 53.10 |
| 0.35 | 7.00 | 3.50 | 24.50 | 2.25 | | 3.50 | 30.25 | 24.50 | 54.75 |
| 0.36 | 7.20 | 3.50 | 25.20 | 2.40 | | 3.60 | 31.20 | 25.20 | 56.40 |
| 0.37 | 7.40 | 3.50 | 25.90 | 2.55 | | 3.70 | 32.15 | 25.90 | 58.05 |
| 0.38 | 7.60 | 3.50 | 26.60 | 2.70 | | 3.80 | 33.10 | 26.60 | 59.70 |
| 0.39 | 7.80 | 3.50 | 27.30 | 2.85 | | 3.90 | 34.05 | 27.30 | 61.35 |
| 0.40 | 8.00 | 3.50 | 28.00 | 3.00 | | 4.00 | 35.00 | 28.00 | 63.00 |
| 0.41 | 8.20 | 3.50 | 28.70 | 3.15 | | 4.10 | 35.95 | 28.70 | 64.65 |
| 0.42 | 8.40 | 3.50 | 29.40 | 3.30 | | 4.20 | 36.90 | 29.40 | 66.30 |
| 0.43 | 8.60 | 3.50 | 30.10 | 3.45 | | 4.30 | 37.85 | 30.10 | 67.95 |
| 0.44 | 8.80 | 3.50 | 30.80 | 3.60 | | 4.40 | 38.80 | 30.80 | 69.60 |
| 0.45 | 9.00 | 3.50 | 31.50 | 3.75 | | 4.50 | 39.75 | 31.50 | 71.25 |
| 0.46 | 9.20 | 3.50 | 32.20 | 3.90 | | 4.60 | 40.70 | 32.20 | 72.90 |
| 0.47 | 9.40 | 3.50 | 32.90 | 4.05 | | 4.70 | 41.65 | 32.90 | 74.55 |
| 0.48 | 9.60 | 3.50 | 33.60 | 4.20 | | 4.80 | 42.60 | 33.60 | 76.20 |
| 0.49 | 9.80 | 3.50 | 34.30 | 4.35 | | 4.90 | 43.55 | 34.30 | 77.85 |
| 0.50 | 10.00 | 3.50 | 35.00 | 4.50 | | 5.00 | 44.50 | 35.00 | 79.50 |
| 0.60 | 12.00 | 3.50 | 42.00 | 6.00 | $0.50 | 6.00 | 54.50 | 42.00 | 96.50 |
| 0.70 | 14.00 | 3.50 | 49.00 | 7.50 | 1.00 | 7.00 | 64.50 | 49.00 | 113.50 |
| 0.80 | 16.00 | 3.50 | 56.00 | 9.00 | 1.50 | 8.00 | 74.50 | 56.00 | 130.50 |
| 0.90 | 18.00 | 3.50 | 63.00 | 10.50 | 2.00 | 9.00 | 84.50 | 63.00 | 147.50 |
| 1.00 | 20.00 | 3.50 | 70.00 | 12.00 | 2.50 | 10.00 | 94.50 | 70.00 | 164.50 |
| 2.00 | 40.00 | 3.50 | 140.00 | 27.00 | 7.50 | 20.00 | 194.50 | 140.00 | 334.50 |
| 3.00 | 60.00 | 3.50 | 210.00 | 42.00 | 12.50 | 30.00 | 294.50 | 210.00 | 504.50 |
| 4.00 | 80.00 | 3.50 | 280.00 | 57.00 | 17.50 | 40.00 | 394.50 | 280.00 | 674.50 |
| 5.00 | 100.00 | 3.50 | 350.00 | 72.00 | 22.50 | 50.00 | 494.50 | 350.00 | 844.50 |
| 6.00 | 120.00 | 3.50 | 420.00 | 87.00 | 27.50 | 60.00 | 594.50 | 420.00 | 1,014.50 |
| 7.00 | 140.00 | 3.50 | 490.00 | 102.00 | 32.50 | 70.00 | 694.50 | 490.00 | 1,184.50 |
| 8.00 | 160.00 | 3.50 | 560.00 | 117.00 | 37.50 | 80.00 | 794.50 | 560.00 | 1,354.50 |
| 9.00 | 180.00 | 3.50 | 630.00 | 132.00 | 42.50 | 90.00 | 894.50 | 630.00 | 1,524.50 |
| 10.00 | 200.00 | 3.50 | 700.00 | 147.00 | 47.50 | 100.00 | 994.50 | 700.00 | 1,694.50 |

## MILLING CENTERS

The CHAIRMAN. Mr. Johnson, when you speak of milling centers where this material is received, can you tell us briefly the number of mills that you have, with just a word or two as to their location?

Mr. JOHNSON. At the present time I believe there are nine mills in the Colorado Plateau. One of them is a Government-owned mill at Monticello, Utah. The Monticello plant was built during the war by the Metals Reserves for treatment of vanadium ores. At the time the domestic uranium program was undertaken early in 1948 this mill was in the hands of the War Assets Administration for disposal, and the

Commission took it over and modified the plant for the recovery of uranium. That plant is operated by the Commission, the contractor being the Galigher Co. of Salt Lake City, which operates the plant on a fee basis.

The other eight plants are all privately owned, built with private money, operated with private money. They buy their ore from the producers and sell the concentrate to the Commission. Mills at Rifle, Colo., and at Uravan, Colo., are owned by the United States Vanadian Co. There is a mill at Grand Junction that was built and is operated by the Climax Uranium Co., a subsidiary of the Climax Molybdenum Co.

The Vanadium Corporation of America operates 3 plants, 1 at Naturita, Colo., 1 at White Canyon, Utah, and 1 at Durango, Colo. The Anaconda has just completed a plant at Blue Water, N. Mex.

The CHAIRMAN. Anaconda Corp?

Mr. JOHNSON. Anaconda Copper Mining Co. They have just completed a plant at Blue Water, N. Mex., which is near Grants, N. Mex.

The Vitro plant in Salt Lake City is owned and operated by the Vitro Chemical Co. The plant was built during the wartime by the Defense Plant Corp. for the treatment of alunite ores from the Marysvale district.

The CHAIRMAN. Do alunite ores contain uranium?

Mr. JOHNSON. No, aluminum. It was built for the production of aluminum.

The CHAIRMAN. I understand that. What did you say about milling?

Mr. JOHNSON. This plant was acquired, was sold by the Government following the war.

The CHAIRMAN. Yes.

Mr. JOHNSON. And has since been acquired by the Vitro Chemical Co. and converted for treating uranium ores. It is obtaining its ore supply from the Marysvale District in Utah, about 150 miles from Salt Lake City.

It also gets ores from the Temple Mountain district in Utah, which is near Greenriver. In addition, being on the railroad, it treats numerous miscellaneous ores, such as those from Montana.

Senator MURRAY. It is sort of a sampling works?

Mr. JOHNSON. No, it is a treatment works. The sampling that is done for the Vitro is not at the Vitro plant, but at the plant of the Utah Sampling Works here in Salt Lake City.

Senator MURRAY. However, the producer gets the same price for his shipment, whether he sends it to a Government mill or to a private institution like the Vitro? He gets the same price?

Mr. JOHNSON. Same price for his ore; yes, sir.

Senator MURRAY. Where does the Vitro Co. get their profit from then?

Mr. JOHNSON. They do not sell us the ore. They sell us the concentrate that is made in the plant by processing the ores, relatively low-grade ores.

Ores containing 0.2 or 0.3 of 1 percent are processed into a high-grade concentrate containing in excess of 50 percent uranium. That in turn goes to the Atomic Energy Commission. It is like a custom smelter.

Senator MURRAY. Yes. Where you ship the ore into the sampling works, they sample it and buy this on the basis of those samples, and then they concentrate the shipment and sell it?

Mr. JOHNSON. And sell us the product of a high-grade concentrate; yes, sir.

Now, in addition to the mills listed, the Kerr-McGee Plant Industries will be building a mill in Shiprock, N. Mex., for treating the ores at the Navaho Indian Reservation.

Has the contract been let?

Mr. WIMPFEN. The contract has been let.

The CHAIRMAN. What type of contract has been let?

Mr. JOHNSON. The type of contract is a contract under which the company undertakes to build a certain type of plant, the plant to be of certain capacity, and to sell the Commission the resultant concentrate at a negotiated price. The company finances its own mill and operates the plant and sells the Commission the concentrate at a negotiated price, and that price is based upon the cost of ore delivered to the mill plus the negotiated price, which is based upon the estimated cost of treatment and the metallurgical recovery and the profit factor.

The CHAIRMAN. Let me ask you at this point—Senator Murray has already commented for the record that you pay on the initial sampling of the ore. Is there a final settlement with the producer in the event it runs more than the sampling or less than the sampling value?

Mr. JOHNSON. The sampling determines the pulp that goes to the assayers for assaying. The ore then flows into the millstream, just the same as any customs smelter or concentrate mill.

Now, there may be a difference in the assay results of the sample. The buyer may have his sample assayed, and it may differ with that of the seller, and the sample can go to umpire, which is a standard practice for the shipper to the various mills or smelters.

### ASSAY UMPIRE

The CHAIRMAN. If there is a criticism from the customer on the values they are getting from the mill, the umpire is the final arbiter, is that correct?

Mr. JOHNSON. That is correct, sir.

The CHAIRMAN. How do you connect up this umpire business? Who is the umpire in the mill?

Mr. JOHNSON. Do you want to speak to that, Mr. Wimpfen?

Mr. WIMPFEN. Yes, sir. There are a number of certified assayers, who by reason of having taken their time and gone to some expense in learning the techniques of accurate analysis, can confirm their expertness in conducting accurate assays. We have assembled hosts of samples that have been analyzed many times, and we send them to these people, and if their assays check with what we have known them to be, we certify them as umpire assayer, and we check them at different times.

If an ore producer has reason to believe there may be some error incurred in the analysis of his pulp he can elect to go to umpire.

The CHAIRMAN. That is, that particular batch of ore is gone already?

Mr. WIMPFEN. But the pulp remains, and from that pulp the umpire assayer can make an analysis, and then if the assay falls within reasonable operating limits it is accepted. If it is outside, in favor of the producer that is—suppose the producer got 0.3 on an ore, and the buyer got 0.25—another pulp goes to the umpire. We will suppose the assayer got 0.32. In that case the buyer will then have to pay for the results of the assay.

The CHAIRMAN. And also have to pay for the additional metal. Does the producer have to pay anything in calling for an umpire?

Mr. WIMPEN. He might have to, if he loses.

The CHAIRMAN. He would be very careful about choosing an umpire, wouldn't he? He would be saddled with those costs?

Mr. WIMPFEN. It is a very nominal cost really, the results of conducting the assay.

The CHAIRMAN. It is very nominal?

Mr. WIMPFEN. Yes, sir; about $15.

The CHAIRMAN. About $15.

Mr. WIMPFEN. Yes, sir.

The CHAIRMAN. Some of those little prospectors out in the hills consider $15 a whole lot of money.

Mr. JOHNSON. And the shipment will probably run to $1,000. It depends on the size of his load. If he ships 1 ton of ore, 30 tons, it will hardly pay him to go to umpire analysis of it.

Senator MURRAY. But these people I was talking over the phone with felt they ought to have some Government checking and be dependent on the Government to see if they have got a correct deal.

Mr. JOHNSON. We do have pulps, and we do constantly run a check on every pulp, and if there is any discrepancy beyond that which we deem acceptable, we ask the producers to check it. There have been very few instances of that kind, however. We do try to protect the producer of the ore in that respect.

We also provide another check upon the accuracy with which the producer's ore is sampled. We do that in the following manner: A lot of ore will be taken in its run-of-mine state, to say, the Utah Sampling Works, where the lot is sampled and a pulp from that lot of ore is obtained for assaying.

We then resample that same lot of ore and get another pulp and another assay. So we confirm not only the accuracy of the analytical work, but the accuracy of the sampling. Then on other occasions we send a lot of ore to other Commission sampling mills, so we have a pretty good check on sampling work and analytical work.

Senator MURRAY. Thank you very much for your statement. There seems to be a lot of detail that you have to go through there.

Mr. JOHNSON. It is an expensive procedure.

The CHAIRMAN. But it comes out of Government.

Mr. JOHNSON. Yes, sir; it does. But it keeps people on their toes to do a good job.

### POLICY ON MILL EXPANSION

The CHAIRMAN. Mr. Johnson, will you tell us what the general policy of the Atomic Energy Commission is on mill expansion. If new mills are necessary, how do you attempt to arrange for the necessary expansion?

Mr. JOHNSON. Our policy during the last 5 years, Mr. Chairman, has been to keep a close watch upon the ore supply, and whenever it appeared that there was an ore supply sufficient to justify either expansion or a new mill, there is an immediate attempt to get a new mill or an old mill expanded. The basis is if there is a reasonable assurance of a 3-year ore supply with a prospect of 5 years, a mill should be built. So far new discoveries have kept pace with production and not only have the life of the operations increased, but the plants have increased their capacity.

Now, as an example we have the developments that have taken place during the past year in the Big Indian Wash area where Mr. Steen has made his sensational discovery, and in the Laguna Indian Reservation. Those are new sources which will greatly increase our present mill production.

The CHAIRMAN. Do you have any plans for the Government to build any such mills?

Mr. JOHNSON. We hope the Government will not have to build the mills. If private enterprise will not build the mills the Government will have to step in. We will not leave the ore idle, because we must have the uranium. We have indications from many companies coming into the field that private capital is now interested in getting into the uranium business. They are looking over the opportunities for building mills, and I see little likelihood that the Government will have to get into the business of building and operating mills. I think to the extent we can leave this business to private industry it is better than having the Government operate.

The CHAIRMAN. I think many would agree with you fellows on that point. What arrangements do you make with a private company that goes in and builds a mill at your invitation? What are your arrangements?

Mr. JOHNSON. There is a negotiation with the company for the construction of a mill. The capacity is given, the estimated cost is set up. We assist the companies by furnishing them with technical information on process methods and process procedures. We arrive at an estimated cost of production and a reasonable profit. Then we have a fixed price for the end product, and the milling company, if it can improve its recovery and improve the efficiency of the operation has a chance for the benefit. If it fails to come up to the standard its profits are reduced.

### AEC FINAL JUDGE

The CHAIRMAN. The Atomic Energy Commission is the final judge as to just what arrangements are made, and what the spread is on what they pay for the ore on the basis of the contained metal and what they sell it for?

Mr. JOHNSON. That is correct, sir.

The CHAIRMAN. And upon your original judgment, without any experience in that particular area, when you accept their plans and estimates, then if they improve it, they profit. If they cannot quite come up to the previous conclusions of efficiency and they lose, isn't there any later adjustment either way? Suppose you are losing money consistently and you would have to shut the mill down?

Mr. JOHNSON. We would have to take a look at it and find out the reason why. If it was due to inefficiency, we don't want to support an inefficient operation.

The CHAIRMAN. Suppose you would have to adjust it, sir? Would you adjust it?

Mr. JOHNSON. That is correct. We have a number of years of experience. We have a pattern. The Commission is operating a plant of its own, and up to the present time there has been no difficulty with practically any of the mills.

The CHAIRMAN. Well, you have had considerable experience and background. You have a long background in mining. Hasn't it been your exprience that certain ores in certain localities will contain impurities not known at the time of the estimates, or you have better ore or better milling than you, at the time of the estimate. How do you take care of that?

Mr. JOHNSON. The ores are usually tested extensively before a mill is built, and for the most part we have found that while there are variations, the pattern is not too different.

The CHAIRMAN. Well, how do these prices range? Give us the range between what they pay for the ore and what they receive for the ore. What is the range in the various mills under your supervision? Now, is the price they first pay for the contained metal in accordance with the assays and what they receive for the finished product?

Mr. JOHNSON. I would prefer not to get into that until in executive session, Mr. Chairman.

The CHAIRMAN. It is classified information?

Mr. JOHNSON. It is the type of information that has a wide influence outside of the particular field.

The CHAIRMAN. There is no question about the influence it would have. I just do not, at the present time, see the classified nature of it, but I will leave that entirely to your judgment, and if you are prepared to answer that at a later date in executive session I would appreciate it.

Mr. JOHNSON. Yes, sir; I will.

The CHAIRMAN. Now, have you ever had an occasion when the producers themselves would be willing to put up a mill, under the same conditions, to mill their own ore?

Mr. JOHNSON. Yes, sir.

The CHAIRMAN. What is your attitude in that connection?

Mr. JOHNSON. We would be glad to consider a milling contract under which the producer would build the mill and sell us his finished product.

I might be specific about that. There is the only one case that has come to us, Mr. F. A. Sitton, who pioneered the development in the Lukachuki area out of Shiprock. He came to me and said, "I would like to get in the milling business. Would you consider a milling arrangement?" I said, "Yes, we would be glad to. It is desirable that anyone that goes into this business should have a good technical and business organization because you can't just advertise and get together a skilled organization." He says, "I have that in mind. I am fully aware of that, and I have in mind working out arrangements with people who would either have or could furnish competent help and a competent organization to satisfy you."

Senator MURRAY. Mr. Johnson, would you be in favor of a cooperative system where a group of producers will get together and organize a corporation to do their milling?

Mr. JOHNSON. I would say this, Senator Murray, that the fundamental consideration, since this is a defense program, is that we get efficient operation, economical operation and good recovery, and whether it is an individual producer or a cooperative organization or a large mining company would make no difference. The answer would be an arrangement that would produce the uranium efficiently would be the final basis of judgment. We close no doors. We close the door to no one who comes in with a milling proposal.

The CHAIRMAN. In no case, do I understand, do you back the money of any of these milling operations? In other words, you simply make contracts?

Mr. JOHNSON. That is right. That has been our experience up to the present time, that the milling companies themselves have financed their own mills.

The CHAIRMAN. No guarantee from the Government at all?

Mr. JOHNSON. No, sir; with the exception I think one company did obtain an RFC loan for part of its operations, and I assumed that during the operation of the Defense Production Administration loans, Government loans might have been available through its channels, but the companies that built the mills were able to finance them themselves.

The CHAIRMAN. Does the Commission recommend such loans?

Mr. JOHNSON. We have only had one occasion, sir, and that was for a partial loan in connection with one of the plants, with the RFC.

The CHAIRMAN. You didn't recommend the loan then?

Mr. JOHNSON. I am not sure whether it was a question of recommending the loan or whether it was a statement regarding the essentiality of this plant for the uranium-production program. As I recall, I don't believe we were requested for any guarantee.

The CHAIRMAN. I did not mean a guarantee, but you did recommend that the plant should be built and gave the lending organization to understand you were favorable to the loan?

Mr. JOHNSON. We gave the lending corporation the statement that the operation of this plant was considered important and desirable in connection with the uranium program. I think that is as far as we were asked to go.

### MILL COSTS

The CHAIRMAN. On the record, would you estimate the cost of these mills, that is a 100-ton mill, and 200-ton mill, and so forth, installed?

Mr. JOHNSON. I think that a 200-ton mill might range in cost between $2 million and $3 million, depending upon power facilities that had to be installed and housing. It could be a higher figure, depending on the location, the housing, and the powerplant.

The CHAIRMAN. Supposing the power were available and housing not necessary, just the mill itself?

Mr. WIMPFEN. That would vary greatly, Mr. Chairman, depending upon the amenability of the ore. We have now at present some 28 ore types, all of which require somewhat different treatment processes.

The CHAIRMAN. Give us the range of costs.

Mr. WIMPFEN. The range of cost for a 200-ton mill?

The CHAIRMAN. Yes; or 100-ton, or both.

Mr. WIMPFEN. Let's take the 200-ton mill because those figures are fresher in my mind. A 200-ton mill might range, under a given set of circumstances as to the availability of housing and power, from $1,800,000 to about $2,800,000.

The CHAIRMAN. Let's just confine it to the mill alone. We can always tell something about the installation costs of the necessary equipment to supply the power, or the housing costs. It is the mill we are interested in. What does that cost?

Mr. WIMPFEN. That is what I was referring to.

The CHAIRMAN. $1,800,000?

Mr. WIMPFEN. $1,800,000 to $2,800,000, depending upon the amenability of the ore.

The CHAIRMAN. Depending upon the ore?

Mr. WIMPFEN. Yes, sir.

The CHAIRMAN. That is very interesting.

Mr. Johnson, title 10, Atomic Energy Commission, chapter 1, has already been submitted?

Mr. JOHNSON. It has.

The CHAIRMAN. For the record I note on page 81, Prospecting for Uranium, a pamphlet dated October 1951, revised, and published by the United States Atomic Energy Commission and the United States Geological Survey, Appendix 3 thereof states: "United States Atomic Energy Commission domestic price schedules, 10-year guaranteed minimum price."

Is that still substantially correct?

Mr. JOHNSON. Yes, sir; that has not been changed, and it has not become ineffective.

The CHAIRMAN. And I call your attention to Circular No. 2 on page 84: "Bonus for the discovery and production of high-grade domestic uranium ore."

Mr. JOHNSON. That is still in effect, and no one has collected the bonus. I might say in explanation of that when we started this program the thought was there would be opportunities in this country for the discovery of high-grade pitchblende deposits of the type of the deposits at Great Bear Lake in Canada, and the $10,000 bonus could be collected by anyone who found that type of deposit. We haven't found that deposit. We have found that the ores furnishing the uraninum for our domestic program are the Colorado-type ores. Therefore, we wanted to put in an additional bonus program that would be effective for those ores, and that was a consideration for the initial production bonus which provides the producer with some $15,000 to $35,000 bonus over and above the established price for his first production, depending upon the grade of the ore produced.

The initial production bonus is paid on the basis of the amount of ore delivered, so it is not necessary for him to deliver any given quantity to collect the bonus. If he delivers the 10,000 pounds he will receive from $15,000 to $35,000 bonus over the established price.

This $10,000 bonus may have some takers before long, but up to the present time no one has collected.

The CHAIRMAN. That was just a part of the incentive for the end of the rainbow?

BONUS PAYMENTS

Mr. JOHNSON. At the beginning it was thought it might be near. It has not proven so. We left it stand, but we have paid out $2,469,000 under the initial production bonus program.

The CHAIRMAN. To November 1, 1953?

Mr. JOHNSON. To November 1, 1953, and it began on June 27, 1951; 170 new mines have qualified for the bonus; 148 other mines have qualified to being mines that had some production before the issuance of this bonus.

The CHAIRMAN. What is the total number of producers at the present time approximately?

Mr. JOHNSON. It is approximately 525.

The CHAIRMAN. That is a very good showing.

Mr. JOHNSON. We have had 170 new mines come in since we have issued this bonus program.

The CHAIRMAN. And they are mostly located in Colorado and Utah?

Mr. JOHNSON. Colorado, Utah, Wyoming, and Montana, but the big production up to the present time has been in the Colorado-Utah-Arizona-New Mexico area.

The CHAIRMAN. Are the newspaper reports correct, that there has been a rather substantial discovery in Idaho?

Mr. JOHNSON. I am not aware of what the details are.

The CHAIRMAN. But there has been a discovery reported there at least.

Mr. JOHNSON. I am not certain. I did not see that report.

The CHAIRMAN. I will ask at this time that Appendix 3, United States Atomic Energy Commission Domestic Price Schedules, Circular No. 1, Ten Year Guaranteed Minimum Price, be included in the record, starting at page 81 of the pamphlet, "Prospecting for Uranium" already described, and ending on page 84, and that Circular No. 2, "Bonus for the Discovery and Production of High-Grade Domestic Uranium Ore," beginning on page 84 and ending on page 87 be included in the record at this point as a part of Mr. Johnson's testimony.

APPENDIX 3

UNITED STATES ATOMIC ENERGY COMMISSION DOMESTIC PRICE SCHEDULES

CIRCULAR NO. 1. TEN-YEAR GUARANTEED MINIMUM PRICE

Section 60.1 *Ten year guaranteed minimum price*—(a) *Guarantee.* To stimulate domestic production of uranium and in the interest of the common defense and security the United States Atomic Energy Commission hereby establishes the guaranteed minimum prices specified in paragraph (b) of this section, for the delivery to the Commission, in accordance with the terms of this section during the ten calendar years following its effective date, of domestic refined uranium, high-grade uranium-bearing ores and mechanical concentrates, in not less than the quantity and grade specified in paragraph (e) of this section. This guarantee does not apply to uranium-bearing ores of the Colorado Plateau area, commonly known as carnotite-type or roscoelite-type ores, prices for which are established by section 60.3.

NOTE.—The term "domestic" in this section, referring to uranium, uranium-bearing ores and mechanical concentrates, means such uranium, ores, and concentrates produced from deposits within the United States, it territories, possessions and the Canal Zone.

(b) *Guaranteed minimum prices.* The following minimum prices are established:

(1) For uranium-bearing ores and mechanical concentrates, $3.50 per pound of $U_3O_8$ (uranium oxide) determined by the Commission to be recoverable, less cost per pound of refining such ores or concentrates to standards of purity required for the Commission's operations, to be determined by the Commission after assay of a representative sample.

(2) For refined uranium products, $3.50 per pound contained $U_3O_8$ (uranium oxide).

Prices are f. o. b. railroad cars or trucks at shipping point designated by the Commission convenient to mine, mill, or refinery. Weights are avoirdupois dry weight.

(c) *Making an offer.* Anyone who has domestic refined uranium, high-grade uranium-bearing ores, or mechanical concentrates of the quantity and grade specified in paragraph (e) of this section, may offer it for delivery to the Commission by sending a letter or telegram addressed as follows: U. S. Atomic Energy Commission, P. O. Box 30, Ansonia Station, New York 23, N. Y., Attention: Division of Raw Materials.

With each offer there should be furnished a representative ten-pound sample and the following information:

(1) Location of property;

(2) Character of material offered for delivery (state whether refined uranium, mechanical concentrates, or uranium-bearing ores, indicating approximate composition);

(3) Amount of material offered;

(4) Location of material offered;

(5) Origin of material if offered by other than producer;

(6) If material is owned, in whole or in part, by any person other than the person making the offer, the name of each person having such ownership and nature of his rights; and

(7) Name and address of person making the offer.

NOTE.—The reporting requirements hereof have been approved by the Bureau of the Budget pursuant to the Federal Reports Act of 1942.

(d) *Purchase contract.* Upon receipt of an offer and sample, an analysis of the sample will be made. If the sample and the information furnished are determined by the Commission to meet the conditions of this section, the Commission will forward to the person making the offer a form of contract containing applicable terms and conditions ready for his acceptance. Prices will be not less than the applicable prices of paragraph (b) of this section.

(e) *Minimum quantity and grade.* No delivery will be accepted under this section of less than ten short tons (2,000 pounds per ton) of ores or mechanical concentrates, nor of ore or mechanical concentrates which assay less than 10 percent $U_3O_8$ by weight. No delivery will be accepted under this section of less than one short ton of refined uranium, nor of refined uranium which contains by weight less than 97 percent $U_3O_8$ in black uranium oxide or 87 percent $U_3O_8$ in sodium uranate. However, the Commission will be interested in negotiating reasonable terms with respect to deliveries of high-grade ores and refined products in lesser quantities and grades than those specified in this section.

(f) *Large quantities or special conditions.* The prices established in paragraph (b) of this section are minimum prices. The Commission may by negotiations establish higher prices for guaranteed delivery of lots of ores or mechanical concentrates substantially in excess of ten short tons, or for lots of refined uranium substantially in excess of one short ton. The Commission also may by negotiation establish higher prices for delivery of ores, mechanical concentrates, or refined uranium under other special conditions, taking into consideration such factors as refining and milling costs, transportation costs, and other applicable factors.

(g) *Other valuable minerals.* In making payment for material delivered to it in accordance with this section, the Commission will give consideration to the existence of recoverable gold, silver, radium, thorium, or any other valuable constituent in the light of the cost of recovery.

(h) *Licenses.* Arrangements will be made by the Commission for the issuance of licenses, pursuant to the Atomic Energy Act of 1946, covering deliveries of source material to the Commission under this section (sec. 5 (b), 60 Stat. 761).

*Effective date.* This circular will become effective at midnight, April 11, 1948.

Dated at Washington, D. C., this 9th day of April 1948.

By order of the Commission.

WALTER J. WILLIAMS,
*Acting General Manager.*

CIRCULAR NO. 2. BONUS FOR THE DISCOVERY AND PRODUCTION OF HIGH-GRADE URANIUM ORE

Section 60.2 *Bonus for the discovery and production of high-grade domestic uranium ore*—(a) *Discovery and production bonus.* To stimulate prospecting for, discovery of, and production from new high-grade domestic uranium deposits and in the interest of the common defense and security the United States Atomic Energy Commission will pay, in addition to the guaranteed minimum price established in section 60.1, a bonus of $10,000 for delivery to the Commission, after the effective date of this section, of the first 20 short tons (2,000 pounds avoirdupois dry weight per ton) of uranium-bearing ores or mechanical concentrates assaying 20 percent or more $U_3O_8$ by weight from any single mining location, lode or placer, which has not previously been worked for uranium (or in the case of production from lands not covered by such a mining location, from an area comparable thereto, as determined by the Commission). This bonus offer does not apply to delivery of ores of the Colorado Plateau area commonly known as carnotite-type or roscoelite-type ores; under section 60.3, the Commission has established guaranteed minimum prices for delivery of such ores including a development allowance and premiums for better grade.

NOTE.—The term "domestic" in this section, referring to uranium-bearing ores and mechanical concentrates, means such uranium, ores and concentrates produced from deposits within the United States, its territories, possessions and the Canal Zone.

(b) *Nature of bonus.* The bonus of $10,000 offered in this section is a bonus to encourage the discovery of new uranium resources. However, it will be paid, not for discovery alone, but only in connection with delivery to the Commission, pursuant to section 60.1, of ores produced from the location, as an independent and additional part of the price established by the Commission under that section.

(c) *Who may claim.* The person lawfully entitled to deliver ore to the Commission pursuant to Section 60.1, may claim the bonus offered in paragraph (a) of this section. A bonus will be paid only once for production of ores from any single lode or placer location (or, in the case of production from lands not covered by such a location, from an area comparable thereto, as determined by the Commission). The Commission expressly reserves the right to determine whether production from a given location is the first production from such location for the purposes of this section or whether such location or property has previously been worked for uranium, whether production is such as to which a bonus has already been paid, or whether for any other reason a bonus is not payable. In making this determination the Commission will be guided by the mining laws of the United States which provide, generally, that lode locations may extend in lode or vein formation up to 1,500 feet along the vein and in width 300 feet on each side of the middle of the vein, the end lines of the location being parallel to each other; and that placer locations may not be greater than 20 acres for each location or 160 acres in a single location for up to eight locators. The fact that a bonus has already been received will not prevent the payment of another bonus to the same person with respect to production from a different location.

(d) *Notice of discovery and production.* Notice of the discovery of a uranium deposit and production therefrom believed to meet the requirements of paragraph (a) of this section should be forwarded to the Commission by letter or telegram, to the address specified in paragraph (f) of this section, together with an offer to deliver such ore to the Commission under section 60.1. In addition to the information and the 10-pound sample required under section 60.1, the following must be furnished:

(1) A brief description of the location of property indicating its size and relationship to mineral monuments or the public land surveys;

(2) Name of owner of record of property;

(3) Location of Recorder's Office where ownership is recorded.

NOTE.—The reporting requirements hereof have been approved by the Bureau of the Budget pursuant to the Federal Reports Act of 1942.

(e) *Inspection of claim.* Upon receipt of a notice of discovery and sample, forwarded as required in Section 60.1, an analysis of the sample will be made. If the sample and supporting data indicate the claim is likely to meet the requirements of paragraph (a) of this section, an inspection of the property and verification of the weights and assays of material produced will be undertaken

by the Commission. On the basis of a report of such inspection and verification, if favorable, the Commission will determine the quantity of ore produced. If this determination indicates that the production requirements established in paragraph (a) of this section have been met, the Commission will pay the bonus in addition to the price established under section 60.1, when delivery of such ore is completed.

(f) *Inquiries and communications.* Inquiries about this section and all other communications should be addressed as follows: U. S. Atomic Energy Commission, P. O. Box 30, Ansonia Station, New York 23, N. Y., Attention: Division of Raw Materials.

(g) *Licenses.* Arrangements will be made by the Commission for the issuance of licenses, pursuant to the Atomic Energy Act of 1946, covering deliveries of source material to the Commission under this section (sec. 5 (b), 60 Stat. 761).

*Effective date.* This circular will become effective at midnight, April 11, 1948.

Dated at Washington, D. C., this 9th day of April 1948.

By order of the Commission.

WALTER J. WILLIAMS,
*Acting General Manager.*

The CHAIRMAN. Now I also have a release of September 23, 1953, a release from the Atomic Energy Commission. That is still substantially correct, is it not?

Mr. JOHNSON. Yes, sir; that is an extension of the term of the Circulars 5 and 6. That is correct, sir.

The CHAIRMAN. Then I will ask that this circular, No. 499, Uranium Ore Price and Initial Production Bonus Schedules Extended, appear at this point in the record as a part of Mr. Johnson's testimony.

UNITED STATES ATOMIC ENERGY COMMISSION,
*Washington 25, D. C.*

No. 499. For release in afternoon newspapers, Wednesday, September 23, 1953.

URANIUM ORE PRICE AND INITIAL PRODUCTION BONUS SCHEDULES EXTENDED

The United States Atomic Energy Commission has extended the expiration date of the guaranteed minimum price schedule for uranium ores of the Colorado Plateau area, and also has extended the time during which initial production of uranium ore from new domestic mines will be eligible for bonus payments. The actions were taken for the purpose of continuing the Commission's program of encouraging the production of uranium from domestic sources.

The Commission's Domestic Uranium Program Circular 5, Revised, has been extended to cover the period through March 31, 1962, from its previous expiration date of March 31, 1958. This circular, which went into effect on March 1, 1951, provides guaranteed minimum base prices for the uranium oxide content of carnotite-type and roscoelite-type ores of the Colorado Plateau area. The price schedule ranges from $1.50 to $3.50 per pound of uranium oxide content, depending upon the grade of the ore, together with certain allowances and premiums.

Domestic Uranium Program Circular 6, which established a bonus for initial and certain other production of uranium ores from domestic mines delivered under its terms between March 1, 1951, and February 28, 1954, now has been extended through February 28, 1957.

For eligible new mining properties, bonus payments are made on each pound of uranium oxide in acceptable ores delivered to qualified mills or Commission buying stations up to and including the first 10,000 pounds of uranium oxide. For eligible mining properties which produced less than 10,000 pounds of uranium oxide during the period from April 9, 1948, to March 1, 1951, bonus payments are made on the difference between 10,000 pounds of uranimum oxide and the number of pounds sold between April 9, 1948, and March 1, 1951.

Bonus payments range from $1.50 to $3.50 per pound of uranium oxide in acceptable ores produced from eligible mining properties, depending on the grade of the ore. Thus, the maximum bonus which may be obtained from production of new mines ranges from $15,000 to $35,000, depending upon the grade of ore delivered.

Bonus payments are made directly by the Commission and not by the receiving station or mill, and are in addition to purchase payments made pursuant to ore-buying schedules. Before bonus payments are made, the producer must make application to the Commission, and the Commission must certify that the mine is eligible for the bonus.

Copies of Circular 5, Revised, and Circular 6 may be obtained from the Commission's Grand Junction operations office, Post Office Box 270, Grand Junction, Colo., or from other Division of Raw Materials' offices of the Commission.

### NO LONGER A HAVE-NOT NATION

The CHAIRMAN. Now will you tell me, Mr. Johnson, if you can, or if you care to, noting the rather phenomenal increase in the discoveries and production of this important material for the very few years that we have been engaged in it, and the relatively short period of time that the Atomic Energy Commission has offered these bonuses and price guarantee, what degree of self-sufficiency we might attain in the United States, including our neighbors on the north and south, Canada and Mexico?

Mr. JOHNSON. I would not want to predict what the future holds in specific quantities, or try to predict what would constitute self-sufficiency. I can only say that as far as the domestic program is concerned there were those, I am sure, in 1948, when I first came into the program, who considered the United States a have-not nation in regard to uranium.

The CHAIRMAN. We were considered a have-not nation in many other minerals.

Mr. JOHNSON. With respect to uranium, there is no such idea prevalent today, and as I mentioned before, we have moved ahead and production has increased rapidly over the past 5 years.

I look forward in the next 2 to 3 years to doubling what we have today. That is not going to be the end. I look forward to still further increases.

With that increase, but with the requirements that the military has set for the next several years in order to attain the atomic strength desired, we will require all of the foreign ore that we have in sight, as well as our domestic.

With domestic production increasing, I certainly would think that looking ahead, industrial development for atomic power will not be handicapped for many years for lack of uranium. I think there will be large quantities found in the United States and on the North American Continent, but that is about as much crystal ball gazing as I care to do.

The CHAIRMAN. You heard the testimony this morning of Mr. Robert Palmer, of the Colorado Mining Association, when he predicted that we could be self-sufficient if the proper program were carried on. You heard that testimony, did you not?

Mr. JOHNSON. Yes, sir.

The CHAIRMAN. I know that you have a good grasp of what is going on in the manufacturing of war material, and the contemplated commercial use. You also probably know more than any other one man about the present and potential production, and I would ask you to say whether this phenomenal development doesn't indicate we will have self-sufficiency in time of emergency? I am talking about the type of emergency which many military strategists, of which I am not one,

think will make it very unlikely that we will be able to ship any great amount of ore across either ocean. So we are looking forward as we have in all these 77 strategic materials and metals, to our becoming as nearly self-sufficient as we can in this Nation for an emergency of that kind, and certainly if it is at all possible, self-sufficient in the Western Hemisphere.

Now, without crystal ball gazing, but based upon your knowledge, does it look like we might be headed in that direction with proper understanding of the problem by Congress and the Atomic Energy Commission?

Mr. JOHNSON. That is a difficult question to answer, Mr. Chairman. The immediate thing, we have got a timetable to build up atomic strength during a limited period of time.

None of the uranium that is being acquired by the Commission at the present time from domestic and foreign sources is being consumed except for the test shots, such as those that have been made in Nevada. All of the uranium is going into fissionable material, weapon components, and the objective is to build up that stock as rapidly as possible. Goals and targets have been set which require all of the uranium that we can get during this limited period.

When we get beyond that, there is a question of how much is going to be required to maintain military strength in this field. It may be that the safest from the standpoint of the defense of the country is to have an atomic arsenal that is sufficient to meet a war and not depend upon the production of uranium during the war period.

The CHAIRMAN. Well, my observation in that connection is that you have already entered into the crystal-ball area when you say positively that you can use all of the uranium ore you can get from all nations for the next several years. I would take that statement just a little mildly.

Mr. JOHNSON. Well, we are speaking of a relatively short period of time, and the requirements, the targets, and goals are very high. We do not see that there can be an oversupply within this period.

The CHAIRMAN. I think that is a good statement.

Mr. JOHNSON. Furthermore, the amount of uranium that can be handled in the big production plants is also subject to some variation.

The CHAIRMAN. Well, of course, as far as the plants are concerned, their capacity and their number are unlimited, are they not? Just limited according to the Atomic Energy Commission's judgment as to where they should be and the capacity they should assume?

Mr. JOHNSON. I am speaking of something more definite, Mr. Chairman. I am speaking of the plants that have been authorized by Congress during the last year and are in process of construction here now.

The CHAIRMAN. One of the reasons for this hearing is that Senator Murray or any other Senator who cares to read the record will be able to debate the subject when anything is recommended to Congress through this Commission. I do not believe, speaking as 1 of the 96 Senators, that you will meet any real opposition to any amount of money you need to build these plants.

Now I would not want the tone of this hearing to depreciate the plan that you have of purchasing all of such material offered by any foreign nation, because in the matter of war preparation, and also for adequate amounts of this material for commercial preparation, cer-

tainly a few million dollars more or less should not be considered by the Commission or the Congress in being on the safe side. But we are talking about when an emergency starts, when they pull the string on the Fourth World War. Have you ever been advised that you can keep the transportation lines open from Africa, where we get a large amount of low-percentage ores.

There are problems of water transportation. During the last war I was with the Metals Reserve and I know that it was dangerous to count on overseas shipments. If there is another war, the problems might be even greater.

The CHAIRMAN. Probably a little worse.

QUESTION OF OVERSEAS SUPPLIES

Mr. JOHNSON. The question of overseas supplies has been considered by the military as well as the Commission, and it is a matter under constant study.

The CHAIRMAN. Do you think right at the moment you can get those low-grade ores during the Fourth World War?

Mr. JOHNSON. I might say they are not shipping low-grade ores.

The CHAIRMAN. They are concentrating in the Belgian Congo?

Mr. JOHNSON. The ores subject to long shipment are high-grade ore and concentrates; yes, sir.

The CHAIRMAN. How high grade?

Mr. JOHNSON. Well, I think our supplies of material coming in are likely to be of about the grade we are producing on the plateau from the mills. Not from the mines, more comparable to the mills.

The CHAIRMAN. Seventy percent?

Mr. JOHNSON. I would not want to mention figures, sir.

The CHAIRMAN. Well, they concentrate the ore.

Mr. JOHNSON. There are concentrating plants.

The CHAIRMAN. I just direct your attention to the fact that it may be very hard at that distance for us to give any air pprotection or any other kind of protection. It would be very unlikely that you would be concentrating ores very long in that area.

Then I would only say to you, Mr. Johnson, and we will have an executive session where we will hear you again. Speaking as chairman of the committee, it is time we looked in our home yard before we become entirely dependent, or dependent for a certain amount of these strategic and critical materials and minerals from any foreign nation, across a major ocean. Would you agree with a statement of that kind?

Mr. JOHNSON. I fully agree that we should develop the domestic sources to the fullest extent possible, sir.

The CHAIRMAN. Thank you. Now you agree then, and you are according to your testimony, as I understood it, following out every lead and every opportunity to increase the production in this country?

Mr. JOHNSON. To the best of our ability, sir. That is our objective. I don't say that we are perfect in effectively carrying out the objective, but we are certainly attempting to do that.

The CHAIRMAN. Now one more question. How does the price paid foreign producers compare with the price to domestic producers?

Mr. JOHNSON. I would like to speak in very general terms, and that is that the domestic producers are certainly being treated no less favorably than foreign producers. I don't want to go beyond that.

The CHAIRMAN. I understand from that statement we are paying about the same to foreign producers as domestic producers?

Mr. JOHNSON. And I will also say this, Mr. Chairman, that foreign countries are patterning their contractual pricing arrangements on our published schedule.

The CHAIRMAN. The price that they demand for the ore concentrates are patterned after our contracts?

Mr. JOHNSON. These published schedules are available all over the world, and they do become a yardstick, so to speak, and something that we have got to be prepared to discuss in connection with foreign negotiations.

The CHAIRMAN. In other words, they take what the traffic will bear. That is about the record of all other minerals, isn't that about right?

Mr. JOHNSON. I would like to say this further, sir, that in my experience with the countries supplying the United States with uranium, they have been guided more by willingness to assist and cooperate in the common defense program than by purely commercial considerations.

The uranium is under Government control. It is not a free commodity in any of these countries. And everywhere in the world, the long range look is toward atomic power as something that may be extremely important in the development of areas deficient in conventional fuels or waterpower. The desire and the willingness to assist in a common defense program has definitely been the important factor in our ability to get the uranium.

The CHAIRMAN. Would you say that is the spirit that Chile is meeting our need for copper?

Mr. JOHNSON. I have no——

The CHAIRMAN. Would you say that is the spirit that Great Britain met us in the production of rubber before we had our synthetic rubber? Do you remember it went to $1 a pound, and it is 21 cents now?

Mr. JOHNSON. I am speaking of the countries that are supplying us with uranium. I am not speaking of the countries where we have been unsuccessful in trying to arrange for uranium purchases, sir.

The CHAIRMAN. Well, the chairman is speaking from experience, with three of these world wars, and trying in his way to determine what we are going to do in the event of a war, an all-out fourth world war, with our potential enemy.

Now, the hearings in Washington have already disclosed that the customer, the United States, the user of these materials, does not profit through the production by low-cost labor in the European and Asiatic nations.

The customer was entitled to the low price, if he could get it, from the low-wage nations, but in zinc, lead, tungsten, and all the rest of these materials, contract after contract was presented to this committee in Washington, showing that the range and the limits on prices paid foreign producers is higher than to domestic producers.

Upon what do you base your opinion that you are going to do any better in a foreign nation? When there is a potential emergency such as there is now will not there be an increase in price?

Mr. JOHNSON. I think the only answer I can give to that, Mr. Chairman, is the uranium we have is in our weapons, in our arsenals, and we are trying to get as much as we can.

The CHAIRMAN. I think that is a very laudable ambition, to make your stockpiles and your domestic production adequate just as soon as you possibly can do it. I think that deserves a lot of praise, and it is very meritorious.

Do you have any further questions?

Senator MURRAY. No.

The CHAIRMAN. Do you have any further statement at this time, Mr. Johnson?

Mr. JOHNSON. No. Thank you.

The CHAIRMAN. I hope you will be available tomorrow. It may be we would like to call you again.

Mr. JOHNSON. Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you very much for being here and offering your very valuable information.

We will have about 3 or 4 minutes recess for the benefit of the reporter.

(Thereupon, a short recess was taken after which the following proceedings were had:)

CHARLES STEEN

The CHAIRMAN. Mr. Charles Steen.

Mr. Steen, we have heard your operations referred to many times before we arrived here, and reference has been made to your discovery during the testimony. Will you please identify yourself for the record and make any statement that you care to make for the benefit of the committee?

## STATEMENT OF CHARLES A. STEEN, PRESIDENT AND CHIEF GEOLOGIST, UTEX EXPLORATION CO.

Mr. STEEN. Mr. Chairman, my name is Charles A. Steen. I am president and chief geologist of the Utex Exploration Co. I wish to thank the chairman and his committee for the opportunity to speak to you today, and present Utex's story and something about our problems.

The CHAIRMAN. We are very glad to hear you.

Mr. STEEN (reading):

DISCOVERY

Early in 1951 Charles A. Steen, a geologist prospecting for uranium, staked 12 adjoining claims in the Big Indian Mining District along the southwest flank of the Lisbon Valley Anticline. These 12 claims now comprise the property of the Utex Exploration Co. A 4-mile road from the county gravel road was built by Steen, who then moved in a drill rig and, on July 3, 1952, at the end of the road near the middle of the Mi Vida claim, began drilling the first diamond core drill hole in the district. The drill hole encountered rich uranium ore on July 6, at a depth of 70 feet and continued in ore for 14 feet.

The Utex Exploration Co. was formed on October 24, 1952. Steen and his mother, Mrs. Roselie Shumaker, held an 81 percent stock interest in the company.

Sinking of the shaft 30 feet southeast from the discovery hole began on October 4, 1952. The first ore was hoisted on December 4, 1952, and ore shipments from the mine were begun on December 6, 1952.

The following is taken from the Bureau of Mines' publication, Information Circular 7669, a very fine report, and accurate in every respect. Utex is mining from the Mi Vida claim.

*Mining operations—Mi Vida claim*

| UTEX | Tonnage | Weighted average $U_3O_8$ |
|---|---|---|
| December 1952, through June 30, 1953 | 9,325 | 0.43 |
| July 1953 | 2,626 | .40 |
| August 1953 | 2,750 | .43 |
| September 1953 | 4,800 | .42 |
| October 1953 | 4,037 | .37 |
| Total | 23,538 | .41 |

G. & G. Mining Co., who have a lease on a portion of the Mi Vida claim which is owned by the Utex Exploration Co., produced the following:

| | Tonnage | Weighted average $U_3O_8$ |
|---|---|---|
| February through June 1953 | 6,350 | 0.59 |
| July 1953 | 2,099 | .56 |
| August 1953 | 2,345 | .48 |
| September 1953 | 2,668 | .49 |
| Total | 13,462 | .55 |
| Grand total for Mi Vida | 37,000 | .46 |
| Estimated G. & G. for October 1953 | 3,000 | |

Big Buck Mining Co., the only other producer in the district. The Big Buck mines have produced for 5 years. Total estimated production, 5,000.

The CHAIRMAN. What was the average, approximately, of those 5,000 tons?

Mr. STEEN. I don't have that available. It is considerably less than Mi Vida. [Reading:]

Total production from the Big Indian Mining District, 45,000 tons.

In addition to this production, the following companies are expected to be in production by 1954: Big Indian Mines, Inc., Cal Uranium, Christensen and Herrin, Little Beaver, and the La Sal Mining Co. These companies can produce a combined total of 1,000 tons a day when in operation, which does not include the Mi Vida production.

The CHAIRMAN. That was just in that immediate area?

Mr. STEEN. That was an area a half mile wide.

The CHAIRMAN. Are these locations under mining claims?

Mr. STEEN. Mining claims; 1,500 feet long by 600 feet wide.

The CHAIRMAN. Placer or quartz?

Mr. STEEN. Quartz.

Senator MURRAY. That means they are 1,500 feet long and 600 feet wide.

Mr. STEEN. These claims are on oil and gas leases, and we consider ourselves very fortunate for the bill that went through Congress to make it possible.

The CHAIRMAN. All the claims that are mentioned here were located in time to be valid by this bill?

Mr. STEEN. Yes, that is right, the majority of them are existing prior claims that will come under this oil and gas bill.

The CHAIRMAN. Are you finding any difficulty in working with the oil and gas producers who had the land leased?

Mr. STEEN. They drilled one hole on this land. It was dry. There is no exploration of oil going on at this time.

The CHAIRMAN. You do not anticipate that you will have difficulty, that they will come back and discover oil?

Mr. STEEN. I don't think there will be any difficulty at all.

The CHAIRMAN. Under the legislation amended this year.

Mr. STEEN. We do not think we will have difficulty in any way. [Reading:]

Production from the Big Indian Mining District prior to the Steen discovery was 1,500 tons, produced over a 4-year period. Therefore, the present rate of production per year is 120 times greater than it was in 1952. The production figures are expected to increase by a similar multiple in the future. By comparing the total production with the estimated reserves it is evident that only one-fifty-third or 1.9 percent of the deposit has been mined. On the basis of the ore reserves as of October 1953, 98.1 percent of the ore is still in the ground and the reserve figure is expected to rise faster than the production figure.

The CHAIRMAN. Isn't that customary in mining operations, that if a profit incentive is there, that development generally keeps pace with production?

Mr. STEEN. Yes, sir; that is very true. All this new ore reserve, with the exception of Cal Uranium, was drilled in the last few months by private companies and private capital, including Utex. [Reading:]

This is conclusive evidence, I believe, that the ore can be mined at a faster rate, certainly up to 1,000 tons per day.

Several changes in the present United States AEC buying program would accelerate this production. First, a guaranteed market for an indefinite tonnage of ore, and not just a guaranteed price.

Second, higher hauling allowance.

Third, abandonment of the high lime penalty.

Fourth, the most salient factor, however, would be a considerable increase in the depletion allowance.

The CHAIRMAN. You will go into detail as to what the allowance or lime penalty actually is, will you not?

Mr. STEEN. I am not prepared to go into it at the present time. I will be glad to get the information and add it tomorrow.

The CHAIRMAN. Fine. You can add it to your testimony. (See p. 72.)

Mr. STEEN (reading):

It must be stated here that no requests for Government assistance were advanced by the Utex Exploration Co. nor was any taxpayers' money used in the development of the Utex property. Utex, in fact, has dispensed $163,900 for drilling alone and Big Indian Mines, Inc., has expended $57,788 for drilling, making a grand total of $221,788 for both companies.

The CHAIRMAN. That is the exploration?

Mr. STEEN. Yes, sir; solely the exploration.

The CHAIRMAN. How much of your exploration proceeded production?

Mr. STEEN. All the exploration we had in the beginning was that one drill hole. All the exploration has been subsequent to production, and financed from production. We started from scratch. We have had to pay our way for more production.

The CHAIRMAN. Proceed.

Mr. STEEN (reading):

The total cost for roadbuilding on the Utex property is $25,000.

The CHAIRMAN. Did you pay that cost also?

Mr. STEEN. We have. [Reading:]

This brings the total amount to $246,868 and that figure, gentlemen, is a direct saving to the taxpayer.

The CHAIRMAN. That is a direct saving to the taxpayer over any method that would advance the money for such exploration and roadbuilding?

Mr. STEEN. Yes, sir. [Reading:]

As a geologist and uranium producer, it is my firm opinion that the reserves of the Big Indian Mining District, San Juan County, Utah, as a whole, have only been scratched and that the bulk of the uranium in the Colorado Plateau has yet to be found. We can be self-sufficient in uranium if a favorable market and tax structure encourage maximum exploration and production.

The CHAIRMAN. Do you later go into the matter of how the tax structure might be modified to encourage production?

DEPLETION ALLOWANCE

Mr. STEEN. Senator, I made the brief statement that an increase in the depletion allowance would be the single biggest factor. I think I was speaking for the independent uranium miner. I am an independent miner. Likewise, I am a small miner with a big mine. But nevertheless, an increase in price would not help me. It would help the marginal producer. But a higher depletion allowance would encourage everyone, myself included, to pour more money back into the exploration for new uranium.

The CHAIRMAN. You do take advantage of the 15-percent general mining depletion allowance?

Mr. STEEN. Yes, sir; we do.

The CHAIRMAN. In oil production it is 27 percent, is it not?

Mr. STEEN. That is right.

The CHAIRMAN. Would the 27 percent be adequate to encourage production of this nature?

Mr. STEEN. Mr. Palmer recommended a 50-percent depletion.

The CHAIRMAN. I heard his statement.

Mr. STEEN. I would certainly say nothing less than 27½ percent.

The CHAIRMAN. I have several times appeared before the House Ways and Means Committee when the depletion allowance for oil production and drilling production has been attacked. Each time I have argued that the money for petroleum production largely comes from that source, and that it certainly should be continued and not diminished, and that the 15-percent depletion for mining should be increased to 27 percent.

Mr. STEEN. I think it is very well put, Senator, and it would certainly encourage production of uranium on the plateau. You have to use a carrot to make a donkey sing. That depletion allowance is the big carrot and should be made a lot bigger.

The CHAIRMAN. And the way you put it, whether you are miners, watchmakers, or machine-tool producers, there has to be something at the end of the rainbow.

Mr. STEEN. You have to make a profit.
The CHAIRMAN. An incentive to make a profit.
Mr. STEEN. Yes.
The CHAIRMAN. Go ahead.
Mr. STEEN (reading):

RESERVE—BIG INDIAN MINING DISTRICT

(The following is the result of less than a year of exploration, with a large area not touched by a drill:)

| | Tons |
|---|---|
| Utex Exploration Co., 12 claims proven ore | 1,300,000 |
| Big Indian Mines, Inc., Mamie claim | 525,000 |
| Christensen & Herron, Pearl & Sue claims plus | 100,000 |
| Big Buck Mines, 11 claims plus | 100,000 |

These are the claims which adjoin Utex which were the claims I staked in behind the Big Buck claims:

| | Tons |
|---|---|
| Little Beaver, 2 claims plus | 100,000 |
| Cal Uranium | 2,125,000 |

Cal Uranium claims are very large and is all new uranium found since the first of the year in the Big Indian Mining District by private capital.

The CHAIRMAN. Is that the area you described awhile ago of 1 mile by 3 miles?
Mr. STEEN. Half a mile by 3 miles.
The CHAIRMAN. Half a mile by 3 miles. Is it your opinion that this is the only area within the general plateau that would produce uranium, or just happens to be the only discovery confined to that area for the present moment?
Mr. STEEN. As a geologist, I would say that the chances of finding another Big Indian district are very good. The incentive to spend your money depends not only on the hope of finding as big or bigger but also on the take after all tax levies are deducted. The latter can be very onerous.
I wouldn't say that there isn't ore in the plateau bigger than Mi Vida. The chances are that bigger mines than Mi Vida will be found on the plateau.
The CHAIRMAN. In other words, profit incentive is the only real incentive you can offer a prospector or explorer to spend his money and time.
Mr. STEEN. I am very proud of my place in the uranium picture of the Colorado Plateau. But I was not motivated by patriotic reasons to go out and take the gamble that exposed my family to hardships and privations. There had to be an incentive. I wanted to make a million dollars, starting from scratch, and I am well on the way to that million dollars.
The CHAIRMAN. The chief disease of the mining industry over the years is the diminution of the profit motive, is it not?
Mr. STEEN. I spent 90 percent of my time trying to find a grub stake and 10 percent of the time finding uranium. I couldn't find a grubstake because the proper motives are now lacking to the grubstaker and the prospector. Both know the odds of a strike are against them. The prospector also knows that the grubstaker will take 70 to 80 percent of anything found and the grubstaker knows that Uncle Sam's take may make even his take unprofitable. It was a very difficult proposition, but I persevered.

The CHAIRMAN. If your partner takes 70 or 80 percent, you would have to take out several million dollars.

Mr. STEEN. Mr. Berhick, financial writer for Salt Lake Tribune, has mentioned that the uranium miner, to be a millionaire, would have to sell his uranium holdings, and then he would no longer be a uranium miner.

We have taken out $1,304,300 worth of ore since December, and believe it or not, I have taken directly from Utex Exploration my salary, which is liberal, and a $6,000 dividend. The rest has gone back into new exploration for new reserves, to take care of contingencies and high taxes.

The CHAIRMAN. How much of it went for taxes?

Mr. STEEN. Fifty-two percent after depletion allowance.

The CHAIRMAN. That is to the Federal Government?

Mr. STEEN. That is to the Federal Government in addition to State and county.

The CHAIRMAN. What does that amount to approximately?

Mr. STEEN. I am not prepared to answer that definitely. The county takes several thousand dollars.

The CHAIRMAN. Could you furnish that for the record later as a supplemental statement, or if you can furnish it tomorrow, I would be very happy.

TAXES

| | |
|---|---|
| 6 months' production, 1953—January 1–July 1, 1953: | |
| Federal | $130,000 |
| State | 10,000 |
| County | |
| Total | 140,000 |
| Our budget, 1954 estimate for 60,000 tons at $37.75 per ton, is: | |
| Federal | 386,700 |
| State | 14,000 |
| Total | 400,700 |

As I believe that we will exceed 60,000 by a substantial amount, our total tax for 1954 is likely to be around $550,000, plus or minus.

A. K. M.

Mr. STEEN. I think I can furnish it tomorrow.

The CHAIRMAN. All right. Go ahead.

Mr. STEEN. (reading):

EXPLORATION-UTEX

Strong geological evidence indicates that the present reserve picture is far from the final picture and the reserves are expected to increase steadily until the Utex ore body is completely blocked out. Drilling in the past has proved this situation to be valid. Contract drilling is being done by the Moab Drilling Co. for Utex.

EXPLORATORY DRILLING FOR UTEX

| | | |
|---|---|---|
| Total feet drilled to date | feet | 40,994 |
| Total holes | holes | 92 |
| Average depth | feet | 445 |
| Average weekly footage | do | 2,000 |

The CHAIRMAN. Let me ask at that point, at what depth do you find your ore, and what condition are the ore bodies?

Mr. STEEN. This is a riverbed replacement body that varies in thickness from 12 to 40 feet. We are mining the full face of the

ore with those averages. There is no sorting, no attempt to high-grade. We take what is there. All of the Utex production has come from development headings. We are leaving 20 times more ore in the ground than we are taking out.

The CHAIRMAN. Why?

Mr. STEEN. We hope to block out enough ore to justify the construction of a mill by Utex.

The CHAIRMAN. Have you made any application for such a mill, or is it necessary for you to make an application to anyone, any Government body?

Mr. STEEN. We have approached the AEC in Grand Junction, and we are now studying our ore for milling techniques. We have engaged Door & Co. to make a preliminary survey to evaluate the various process, to figure the cost, and to lay the groundwork for negotiations with the AEC for the construction of an independent uranium mill in Moab, Utah.

The CHAIRMAN. Well, is there any objection to your building a mill, or do you have to have a certain type of contract and ore program? Are you making suggestions to and have you negotiations with any Government body?

Mr. STEEN. We cannot negotiate with the AEC for a mill until we ourselves know what it is going to cost, what the process, the personnel, the reagents, and all the things that enter into a complex mill will be. We do not know ourselves at the present time.

The CHAIRMAN. The testimony of Mr. Johnson was that they were doing everything they could to encourage mill production, whether it was done by the owner of the ore or private capital. There is no information that you have to the contrary; is there?

Mr. STEEN. There certainly isn't on the part of the AEC. They are running pilot-plant tests. They are cooperating with Dorr & Co. They are doing everything possible to expedite the preliminary work so we can start to negotiate.

But it is a surprising thing about the uranium milling picture. Prior to Utex's ore body very few of the big mining companies and international concerns were interested in building a uranium mill. It now appears they have decided, overnight, that uranium mills are profitable. There seems to be a great deal of the more or less big club or lead pipe type of maneuvering by some parties to either force their way into a partnership with Utex or control in the mill scheduled for Moab.

The CHAIRMAN. There has been no indication to you, however, that the AEC has any part in this business?

Mr. STEEN. I do not believe that the AEC has any part in this at the present time. There are certainly no indications the AEC has.

The CHAIRMAN. In other words, you will offer to spend your own money, and all you would want would be the same deal that was given to any other milling company.

Mr. STEEN. That is correct. The only thing we want is the right to build a mill, to design it, to supply the capital needed, to have the technical and metallurgical problems worked out, and if we want partners, to choose them on our terms, and not by someone coming in behind.

The CHAIRMAN. That is, you are not asking for a loan of any money from the Government?

Mr. STEEN. We are not.

The CHAIRMAN. How could anyone interfere with your operations if you just proceeded to build a mill and offered the concentrates for sale? How could they offer you a lower price than they are giving other mill operators?

Mr. STEEN. It is behind-the-scene operators who are trying to discredit my ability to finance, build, and operate the mill at Moab. I do not know what the existing mill operators are receiving. I do not know how successful our milling process will be, but I do know that no one would invest $3 to $5 million in a uranium mill if he didn't know that it would operate at a profit.

PRICE GUARANTEED

The CHAIRMAN. For the record, I think Senator Murray and I understand what you are saying, but someone will read the record, and we just want to determine and make it a part of the record that as far as the AEC is concerned, that according to Mr. Johnson, it is offering to anyone who puts up some money, to buy the concentrates over a long term of years, and I understood now the price had been guaranteed for 6 years.

Mr. STEEN. The price of the ore as it comes from the mine is guaranteed.

The CHAIRMAN. For how long?

Mr. STEEN. To 1962, I believe.

The CHAIRMAN. Well now, it is 1953. There is a 10-year period. Would that be satisfactory to you, if you got the same price other mill owners are getting for the remainder of the 10 years, or would that have to be extended?

Mr. STEEN. Well, the difficulty is that I have just begun preliminary discussions with the AEC, with no knowledge, no definite knowledge, as to what it will cost, what the process finally arrived at will be. They have been very cooperative up to the present time. They have put their facilities at our disposal. They are expediting the clearance of our key personnel, and they are working with us to arrive at the earliest possible date to negotiate our contract.

The CHAIRMAN. But I am trying to determine for the record, on account of your statement, that there are certain efforts to prevent your doing this, that you would have to form a partnership with someone that maybe you wouldn't care about particularly, or especially the terms. On what do you base that statement?

Mr. STEEN. Mr. Johnston told you about the man who assured him that he had the technical knowledge and the necessary capital to build a mill. My understanding is that the AEC welcomes parties who have these requirements along with the necessary ore reserves. I think that I have these three requirements and what disturbs me is the determined effort of others to belittle my position.

Well, I am primarily, as the world knows, a prospector and therefore, according to some people, I should not at this present time be at the head of my company. I should have been bought out a long time ago. But, unfortunately, I do not think that what we lack in the way of money or experience cannot be obtained except by taking in a partner to provide only money and the know-how.

The CHAIRMAN. I would just observe at this point, one of the chief ingredients of the independent operating economy we try to maintain, and I think Senator Murray would agree with me, is the right of any man to lose his money if he wants to. I am trying to find out what objection to that you would offer.

Mr. STEEN. I wish that uranium was like copper or lead or zinc.

The CHAIRMAN. I don't think you do, because they are broke.

Mr. STEEN. But nevertheless they still know what they are going to receive for their concentrates.

The CHAIRMAN. No, they do not.

Mr. STEEN. From day to day.

Mr. CHAIRMAN. No, they get 10 cents or 12 cents where the foreign producers we have contracts with get about 20 cents, and they are still operating under their contracts, and some of us don't care about that. No one objects to them selling their product at 10 cents if the United States and Congress has taken the constitutional responsibility to assure that price.

But we are trying to trace all this down to an ultimate conclusion, and 3 other members of our committee will, we hope, review the record, and 8 other members of the committee will have to make up their minds after we present our report, so we just want to know what department of Government is objecting to a man spending his own money and offering for sale a product when there are no strings attached. You indicated some strings were being pulled.

Mr. STEEN. There is definitely no outside market for uranium. As Mr. Johnson explained, there is a negotiated price individually. I don't know what USV or VCA or Climax is receiving for their concentrates. I do not know what their cost factors are. It is solely based, as they explained to me, on the tonnage and cost. A reasonable profit is allowed on the operation.

The CHAIRMAN. Regardless of the largeness of your deposit, you will be allowed the same profit as anyone with a smaller deposit?

WANTS FIXED PRICE

Mr. STEEN. The profit from the mine and the profit from the mill are distinct. We are making a profit at the mine. Whether we can make one at the mill, I don't know.

Personally, I would like to see the day arrive when there was a fixed price for uranium concentrates, and let anyone who would like to, develop their deposits and make their plans. That way I would know what I was going to get for my product. If I couldn't make a profit, I deserve to go under, knowing in advance I had to sell at a certain price.

The CHAIRMAN. All you are asking for, as I understand, Mr. Steen, is the same consideration that is being given to other milling operations?

Mr. STEEN. That is all that Utex has ever asked.

The CHAIRMAN. Have you ever had any indications from Mr. Johnson, or any member of the Atomic Energy Commission, that you will not be given this consideration?

Mr. STEEN. This is the first I have met Mr. Johnson. I have had a number of talks with Mr. Wimpfen, and he has assured me the Com-

mission welcomed the construction of a new mill, and they were prepared to sit down and negotiate a price.

The CHAIRMAN. On the same basis, presumably, as any other milling operation?

Mr. STEEN. That is correct.

The CHAIRMAN. I am still trying to find out why you would be held up until you accepted a partner unacceptable to you.

Mr. STEEN. There have been considerable rumors. In fact, they aren't really rumors. There are a great number of individuals and companies who would have the world believe, that although I was very lucky in finding this enormous ore body, I am more or less of a simple simon, and I should not be trusted with its continued growth, that I do not have the resources and know-how to go out and organize a mill, and that I will be unable to hire the technical help, that my costs are too high, I pay my men too much money, folks say, and out of proportion. In short, I am a very young fool who happened to stumble on a very rich deposit.

The CHAIRMAN. You are a maverick?

Mr. STEEN. I beg your pardon?

The CHAIRMAN. You are a maverick?

Mr. STEEN. Yes, sir.

The CHAIRMAN. What I am trying to determine, and based on Mr. Johnson's testimony, he has said they make a contract based upon their estimate of a reasonable profit, which is agreed upon between the milling operator and the Atomic Energy Commission. Now, if you cannot produce according to the estimate, you would lose money, and if you can produce better than the estimate, then you make a little more money. I do not believe he testified there was a further examination to either lessen the profit or pull you out of this. I asked that question, but I am not clear as to what the answer was.

It seems from Mr. Johnson's testimony, they are absolutely fair in their dealings, and then if you can't deliver you do lose money. If you deliver on the agreement, you make money. On the basis of a contemplated reasonable profit, you get a profit, and more if you can produce better.

Mr. STEEN. That is correct.

The CHAIRMAN. Doesn't that eliminate any strings? You have your own money to go out and get your own technical help. Doesn't that eliminate any strings that might be pulled to hold you down?

Mr. STEEN. Well, except that the situation might arise in my negotiations with the Atomic Energy Commission that perhaps we could not agree on what I thought was a fair profit and what they thought was a fair profit.

The CHAIRMAN. There is no indication of that now?

Mr. STEEN. There certainly isn't.

Senator MURRAY. I would like to inquire, how are your mining operations conducted? As you say, these deposits are in the form of a vein with a hanging wall and a foot wall?

Mr. STEEN. No, sir. They are a disseminated river bed which has been replaced with pitchblende.

Senator MURRAY. How could you locate it as a quartz?

Mr. STEEN. There is a recent decision in the State of New Mexico in which the State land commission was granting a placer location

to an individual for uranium which involved the saving of several hundred thousand dollars if it were placer. He filed placer claims on uranium. The State went to the courts and canceled out his claims and gave the location to other individuals, and the State courts upheld that uranium is not a placer but a lode deposit.

Senator MURRAY. That was decided by a court?

Mr. STEEN. Yes, sir. That is the only decision I know of.

I had geological inference that behind the little outcroppings was good ore. I risked my time and money to prove that I was right. The little outcrops of uranium are becoming fewer and fewer in finding uranium at the present time. You have to drill and you have to use geological information and a whole lot of guts and a lot of luck, but I believe that uranium claims are lode claims. They certainly are to a geologist.

Senator MURRAY. How deep did you have to go?

Mr. STEEN. The Mi Vida is located in a canyon on the flank of an anticline, and where I hit the uranium was 75 feet, but in each direction south and north there is 700 feet of overburden over this same uranium ore body, and further north there is 300 feet. It depends on the present erosion, the present surface features, how deep it is to the ore horizon.

The CHAIRMAN. Proceed.

Mr. STEEN (reading):

*Exploratory drilling for Big Indian Mines, Inc.*

| | |
|---|---|
| Total feet drilled to date | 14,473 |
| Total holes | 39 |
| Average depth (feet) | 371 |

In addition to this, drilling has been done by Big Buck mines, Little Beaver, Cal Uranium, Christensen & Herrin and other individuals and companies in the area. The La Sal Mining Co. has, in the last few days, made a significant new find of high grade ore 3 miles north of Utex Mi Vida mine.

The dollar production from the Utex property as of October 31, 1953, was $1,303,400. The figure is expected to exceed $2 million by 1954.

That is all of my prepared statement.

The CHAIRMAN. Now would you like to present the Bureau of Mines Circular 7669 as an exhibit?

Mr. STEEN. I would be very happy to.

The CHAIRMAN. It will be accepted as exhibit No. 1 in Mr. Steen's testimony, entitled "Uranium Mining Operations of the Utex Exploration Co. in the Big Indian District, San Juan County, Utah."

(The circular referred to was marked "Exhibit No. 1, Mr. Steen," and was received in evidence.)

The CHAIRMAN. Will you explain to us a little further, for the benefit of the record, how the Federal tax applies and what effect it has on development and production annually?

Mr. STEEN. Well, I can only explain from Utex's experience. We start out with a hole in the ground, and we had to put another hole beside it to get into production.

The CHAIRMAN. You sink a shaft?

Mr. STEEN. Yes, sir; that is correct, some 35 feet south.

The CHAIRMAN. Beside the drill hole?

Mr. STEEN. Beside the drill hole. I didn't go much further than that on that one drill hole. We qualified for the $35,000 exploration

or development bonus. It was in a few months, probably 90 days. I don't know the exact figure. But unfortunately we were involved in oil and gas litigation and our claims could not be certified, so we did not receive the $35,000 until we had produced some $300,000 in ore, and it was touch and go for the first 60 days. We were all on half salaries, and we were constantly pouring our ore production back into new and better equipment.

WAGE SCALE

The CHAIRMAN. What wages do you pay there generally speaking, for common labor, a machineman, truckdrivers, and any other classifications you might have?

Mr. STEEN. I can't quote you accurately on the hourly wage.

The CHAIRMAN. Just approximately.

Mr. STEEN. Approximately, we provide room and board, and very good board, I might say, and our skilled men get $2.50 an hour for the first 40 hours. We pay——

The CHAIRMAN. 40 hours per week?

Mr. STEEN. Yes, sir. We pay $2.15 for skilled men. I don't think there is anyone in the mine who isn't making $1.75 an hour.

The CHAIRMAN. Do they work extra time to any extent?

Mr. STEEN. Yes, sir; we pay a great deal of overtime.

The CHAIRMAN. What is the overtime?

Mr. STEEN. Time and a half beyond the first 40 hours.

The CHAIRMAN. In each case?

Mr. STEEN. In each case; yes, sir.

The CHAIRMAN. $1.75 is about the lowest, would you say?

Mr. STEEN. Yes.

The CHAIRMAN. And $2.50 is about the highest?

Mr. STEEN. That is in addition to room and board.

The CHAIRMAN. How many men are you working?

Mr. STEEN. I think Utex's total payroll includes 50 men. We are highly mechanized underground. Our underground crew is not very large. We have a geologist, surveyor and assayer, and a metallurgist, plus a mine superintendent.

The CHAIRMAN. You spoke of $6,000 dividends paid by you. I think you said you were rather disappointed on account of taxes. You also spoke of salary. We would not ask you what your salary is.

Mr. STEEN. I would be very happy to state my salary. I get $22,500 a year.

The CHAIRMAN. That seems very reasonable for a man that has made the discoveries that you have. But you testified that only $6,000 was paid out in dividends. Is that in 1952?

Mr. STEEN. That is 1952. We declared a dividend on 50,000 shares of $25,000.

The CHAIRMAN. That is, how much of a profit did that come out of? That is original profit before taxes.

Mr. STEEN. Well, that is pretty hard to answer.

The CHAIRMAN. Just an estimate.

Mr. STEEN. Actually to declare that dividend, I think we did ship some $300,000 worth of ore before we had enough money, and there was considerable discussion about the advisability of taking $25,000

out as a dividend, because we needed the money to put back in equipment and for reserve.

You see, we have a housing problem in Moab that is acute. They are paying $80 to $100 a month for shacks, and Utex has an obligation to provide housing for their employees.

The CHAIRMAN. Did you get any help from any Government agency on the housing situation?

Mr. STEEN. We haven't asked for any help.

The CHAIRMAN. You are building your own houses and will fix your own rents?

Mr. STEEN. We plan to build. Actually we have cash in the treasury that could be dispensed as dividend, but we preferred to build houses and hold it for the mill.

The CHAIRMAN. You have confidence in the future of your operation?

Mr. STEEN. I don't think there is any single individual in uranium that has taken a bigger gamble on the future than I have myself, because if I didn't have confidence I would not be pushing for a mill. I would have sold my reserves and taken my capital gain and got out.

The CHAIRMAN. Does that complete your statement, Mr. Steen?

Mr. STEEN. Yes, sir.

The CHAIRMAN. Do you have any questions, Senator Murray?

There is one question I neglected to ask you. If the mine has a tax going into a higher bracket, does that influence the amount of your production annually?

Mr. STEEN. Utex is a corporation. Garwood & Gurlock is a partnership, and they had nothing invested to begin with, and I understand they are being hurt on their production. They are in the high-income-tax bracket. I know there are mines being operated by individuals who are not mining the full production for the simple reason the more they mine the less they keep.

The CHAIRMAN. Is that a customary thing in the mining business? A successful mining business, must take cognizance of the tax bracket in which it finds itself as additional production will simply put it in a higher bracket, and it will keep less than it would if it cut down production?

Mr. STEEN. That is the story of a few successful miners. You must remember, Senator, that Mi Vida is an exception. The Big Indian Mining District is an exception. We have large contiguous ore bodies of high-grade ore.

The Chairman. It would apply to any organization that was conducting a successful mining operation.

Mr. STEEN. If it was a—if I operated Utex as a partnership, we certainly would not have produced 40,000 tons in this time, because I, as an individual, would be in the 80- or 90-percent income bracket.

The CHAIRMAN. What bracket are you in now?

Mr. STEEN. I don't really know. I have a tax man who keeps me square with Uncle Sam. I know I am paying a considerable part of my income as taxes.

The CHAIRMAN. Well, the point we are trying to establish is whether or not it is true that taxes will affect production.

INCENTIVES

Mr. STEEN. Well, certainly an increase in prices in uranium would help the marginal producers who are producing now, and a higher depletion allowance before the income tax was figured would certainly be an incentive, a major incentive, to turn her loose and mine as much as you could possibly mine.

The CHAIRMAN. We would be in a rather peculiar predicament if the laws passed by Congress prevented us from producing the very metal without which we cannot win a war.

Mr. STEEN. If I were an individual operating a metal mine, I would be a fool to produce the maximum tonnage. I would be depleting my resource, the only thing I had of value, to pour out the ore and be deprived of 85 percent of the profit.

The CHAIRMAN. Except in an all-out war, you would then sacrifice your ore deposits?

Mr. STEEN. They could have it all.

The CHAIRMAN. On a patriotic basis.

Mr. STEEN. Exactly. When you are in a life-and-death struggle, paying income tax isn't very important. But during peacetime I certainly think that with a higher depletion allowance you would get out more. Unless you have an incentive to produce beyond the normal demands, you won't. If you have an ore body that will last you 5 years at 200 tons a month, you are not going to produce it in 1 year at 1,000 tons a month and pay 85 percent of the profit out in taxes. You will keep your ore in the ground.

The CHAIRMAN. When you could hold it to 200 tons and pay 30 to 40 percent, in that area?

Mr. STEEN. Yes, sir; that is true.

The CHAIRMAN. I think that is a very clear statement. Do you have any further information for the committee?

Mr. STEEN. No, sir.

The CHAIRMAN. I think that was a very fine statement, Mr. Steen. We thank you very much for coming before the committee. [Applause.]

Mr. STEEN. Thank you.

(The following information was later furnished by Mr. Steen for the record:)

UTEX EXPLORATION CO. (INC.)

Minerals exploration and development

MOAB, UTAH.

DATA TO BE PRESENTED TO THE MINERALS MATERIALS AND FUELS ECONOMIC SUBCOMMITTEE

*Discovery*

Early in 1951 Charles A. Steen, a geologist prospecting for uranium, staked 12 adjoining claims in the Big Indian mining district along the southwest flank

of the Lisbon Valley anticline. These 12 claims now comprise the property of the Utex Exploration Co. A 4-mile road from the county gravel road was built by Steen, who then moved in a drill rig and, on July 3, 1952, at the end of the road near the middle of the Mi Vida claim, began drilling the first diamond drill hole in the district. The drill hole encountered rich uranium ore on July 6, at a depth of 70 feet and continued in ore for 14 feet.

The Utex Exploration Co. was formed on October 24, 1952. Steen and his mother, Mrs. Roselie Shumaker, hold 51 percent stock interest in the company.

Sinking of the shaft 30 feet southeast from the discovery hole began on October 4, 1952. The first ore was hoisted on December 4, 1952, and ore shipments from the mine were begun on December 6, 1952.

*Mining operations (Mi Vida claim)*

| | Tonnage | Weighted average $U_3O_8$ |
|---|---|---|
| Utex: | | |
| December 1952 through June 30, 1953 | 9,325 | 0.43 |
| July 1953 | 2,626 | .40 |
| August 1953 | 2,750 | .43 |
| September 1953 | 4,800 | .42 |
| October 1953 | 4,037 | .37 |
| Total | 23,538 | .41 |
| G. & G. Mining Co. (who have a lease on a portion of the Mi Vida claim which is owned by the Utex Exploration Co., produced the following): | | |
| February through June 1953 | 6,350 | .59 |
| July 1953 | 2,099 | .56 |
| August 1953 | 2,345 | .48 |
| September 1953 | 2,668 | .49 |
| Total | 13,462 | .55 |
| Grand total for Mi Vida | 37,000 | .46 |
| Estimated G. & G. for October 1953 | 3,000 | |
| Big Buck Mining Co.:[1] Total estimated production | 5,000 | |
| Total production from the Big Indian mining district | 45,000 | |

[1] The only other producer in the district. The Big Buck mines have produced for 5 years.

In addition to this production, the following companies are expected to be in production by 1954, Big Indian Mines, Inc., Cal Uranium, Christensen & Herrin, Little Beaver, and the La Sal Mining Co. These companies can produce a combined total of 1,000 tons a day, which does not include the Mi Vida production.

Production from the Big Indian mining district prior to the Steen discovery was 1,500 tons, produced over a 4-year period. Therefore, the present rate of production per year is 120 times greater than it was in 1952. The production figures are expected to increase by a similar multiple in the future. By comparing the total production with the estimated reserves it is evident that only one fifty-third or 1.9 percent of the deposit has been mined. On the basis of the ore reserves as of October 1953, 98.1 percent of the ore is still in the ground and the reserve figure is expected to rise faster than the production figure. This is conclusive evidence, I believe, that the ore can be mined at a faster rate, certainly up to 1,000 tons per day.

Several changes in the present United States AEC buying program would accelerate this production. First, a guaranteed market for an indefinite tonnage of ore, and not just a guaranteed price; second, higher hauling allowance; and third, abandonment of the high lime penalty. The most salient factor, however, would be a considerable increase in the depletion allowance.

It must be stated here that no requests for Government assistance were advanced by the Utex Exploration Co. nor was any taxpayers' money used in the development of the Utex property. Utex, in fact, has dispensed $163,900 for drilling alone and Big Indian Mines, Inc., has expended $57,888 for drilling, making a grand total of $221,868 for both companies. The total cost for road building on the Utex property is $25,000. This brings the total amount to $246,868 and that figure, gentlemen, is the direct saving to the taxpayer.

As a geologist and uranium producer, it is my firm opinion that the reserves of the Big Indian mining district, San Juan County, Utah, as a whole, have

only been scratched and that the bulk of the uranium in the Colorado Plateau has yet to be found. We can be self-sufficient in uranium if a favorable market and tax structure encourages maximum exploration and production.

*Reserve, Big Indian mining district*

(The following is the result of less than a year of exploration, with a large area not touched by a drill):

| | Tons |
|---|---|
| Utex Exploration Co., 12 claims | 1,300,000 |
| Big Indian Mines, Inc., Mamie claim | 525,000 |
| Christensen & Herron, Pearl and Sue claims | 100,000+ |
| Big Buck mines, 11 claims | 100,000+ |
| Little Beaver, 2 claims | 100,000+ |
| Total | 2,125,000+ |

*Exploration—Utex*

Strong geological evidence indicates that the present reserve picture is far from the final picture and the reserves are expected to increase steadily until the Utex ore body is completely blocked out. Drilling in the past has proved this situation to be valid. Contract drilling is being done by the Moab Drilling Co. for Utex.

Exploratory drilling for Utex:

| | | |
|---|---|---|
| Total feet drilled to date | | 40,994 |
| Total holes | | 92 |
| Average depth | feet | 445 |
| Average weekly footage | | 2,000 |

Exploratory drilling for Big Indian Mines, Inc.:

| | | |
|---|---|---|
| Total feet drilled to date | | 14,473 |
| Total holes | | 39 |
| Average depth | feet | 371 |

In addition to this, drilling has been done by Big Buck mines, Little Beaver, Cal Uranium, Christensen & Herrin and by other individuals and companies in the area. The La Sal Mining Co. has, in the last few days, made a significant new find of high-grade ore 3 miles north of Utex Mi Vida mine.

The dollar production from the Utex property as of October 31, 1953, was $1,303,400. The figure is expected to exceed $2 million by 1954.

## EXHIBIT 1

[Bureau of Mines Information Circular 7669, October 1953]

### URANIUM-MINING OPERATIONS OF THE UTEX EXPLORATION CO. IN THE BIG INDIAN DISTRICT, SAN JUAN COUNTY, UTAH

By Charles A. Steen,[1] George P. Dix, Jr.,[2] Scott W. Hazen, Jr.,[3] and Russell R. McLellan[3]

#### INTRODUCTION AND SUMMARY

Publication of this information circular results from an invitation extended to the Bureau of Mines by the Utex Exploration Co. to visit the company mine, on the Mi Vida claim about 39 miles southeast of Moab, in the Big Indian mining district, San Juan County, Utah. The Bureau is pleased to present this record of the Utex mine—a property that in the relatively short period of 4 months has become one of the major uranium-ore producers on the Colorado Plateau.

The ore deposit was discovered in July 1952 by Charles A. Steen, a geologist-prospector, now chief geologist of the Utex Exploration Co., in the course of drilling the first diamond-core borehole in the Big Indian district. High-grade ore, 14 feet thick, was penetrated by the borehole. Sinking of a shaft, from which to develop the ore body, was begun in October, and the first shipment of

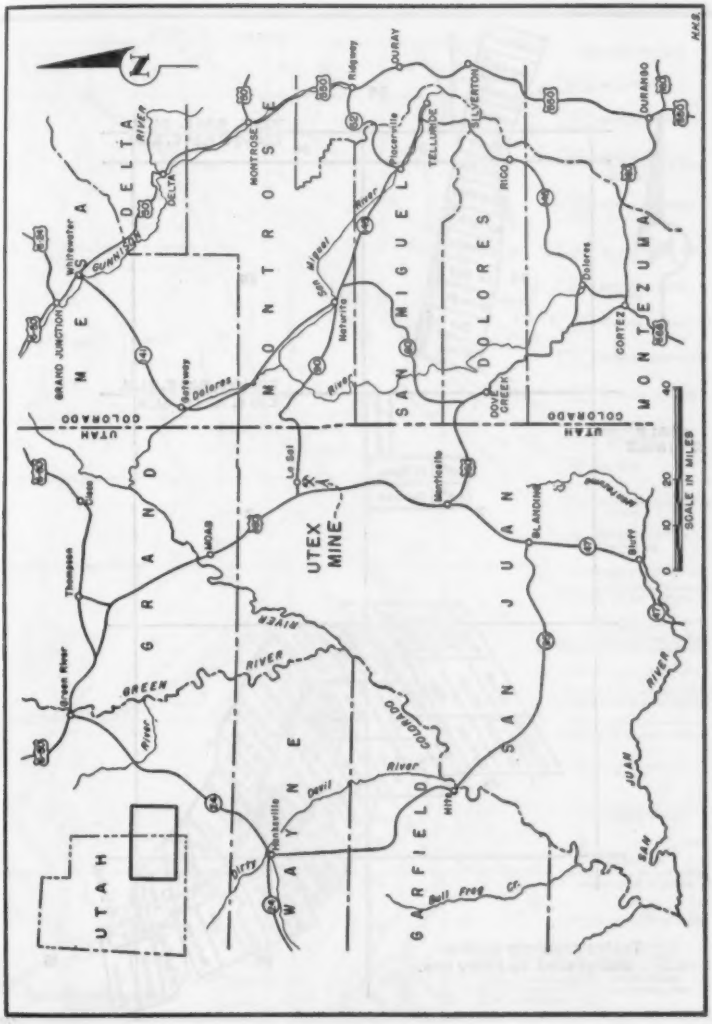
[1] Chief geologist, Utex Exploration Co., Moab, Utah.
[2] Field geologist, Utex Exploration Co., Moab, Utah.
[3] Mining engineer, Mineral Resources Branch, region IV, Bureau of Mines, Denver, Colo.

ore left the property December 6, 1952. Ore production, as recorded on ore-settlement sheets received by the company up to July 15, 1953, totaled 16,000 tons averaging 0.51 percent $U_3O_8$ and 1.26 percent $V_2O_5$. Discovery of the ore body and the large production of ore were achieved without any financial assistance from the Government.

The Big Indian mining district is on the southwest flank of the Lisbon Valley anticline, which plunges to the northwest; the ore-bearing horizon is overlain by a considerable thickness of Jurassic and Cretaceous sediments. In the area the Chinle formation consists of variegated mudstones and siltstones, intraformational conglomerates, and fine- to medium-grained cross-bedded sandstones. The ore-bearing unit, in the Chinle formation, contains fossil flora replaced by pyrite or uraninite or preserved as carbon. Throughout the region carbon has played an important role in concentrating uranium. Two theories as to ore deposition have been expressed, the channel theory and the anticlinal theory.

As soon as the large size of the ore body became apparent, an inclined adit large enough to permit use of mechanical haulage underground was driven to the ore body from a point about 400 feet southeast of the shaft. The adit was completed in May 1953 and is used jointly by the Utex Exploration Co. and the G. &. G. Mining Co., which holds a lease on a 200-foot segment across the 600-foot width of the Mi Vida claim.

The ore is 10 to 23 feet thick, and a modified room-and-pillar method of mining is employed. Ore is loaded underground with shovel loaders into a diesel truck by the Utex Co. and into a trailer by the lessee company for transport to a stockpile on the surface. From the stockpile the ore is moved by trucks to ore-buying stations at Monticello and Thompson, Utah, and Grand Junction, Colo.


UTEX MINE
MESA
DELTA
MONTROSE
SAN MIGUEL
DOLORES
MONTEZUMA
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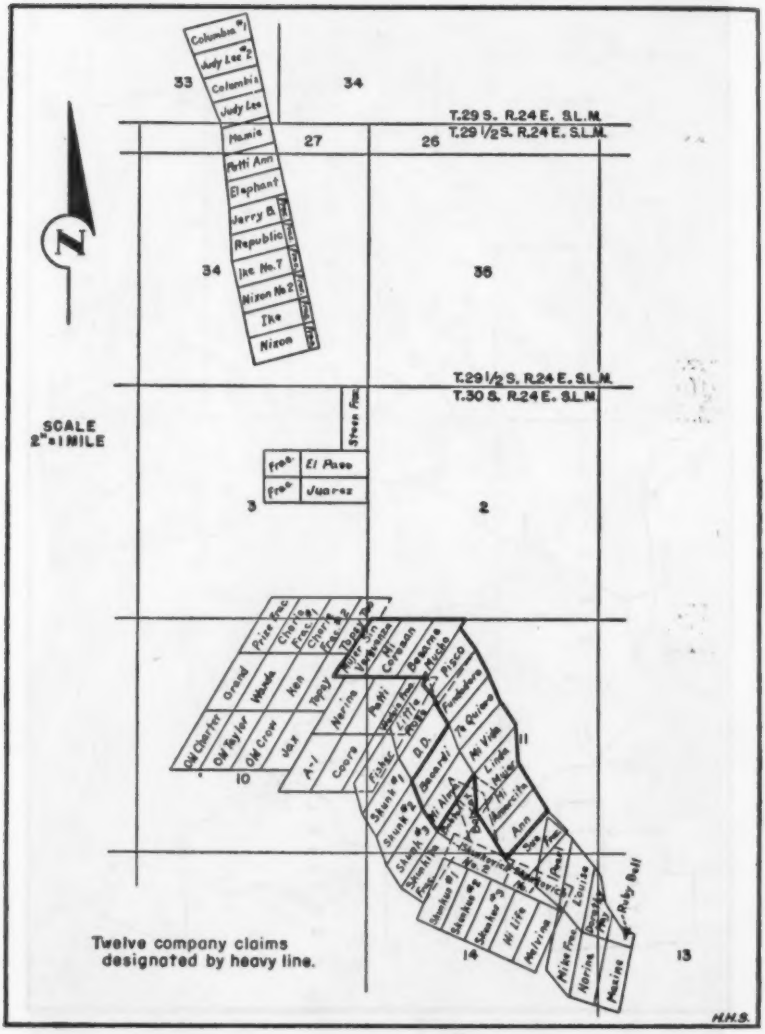
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T.29 1/2 S. R.24 E. S.L.M.
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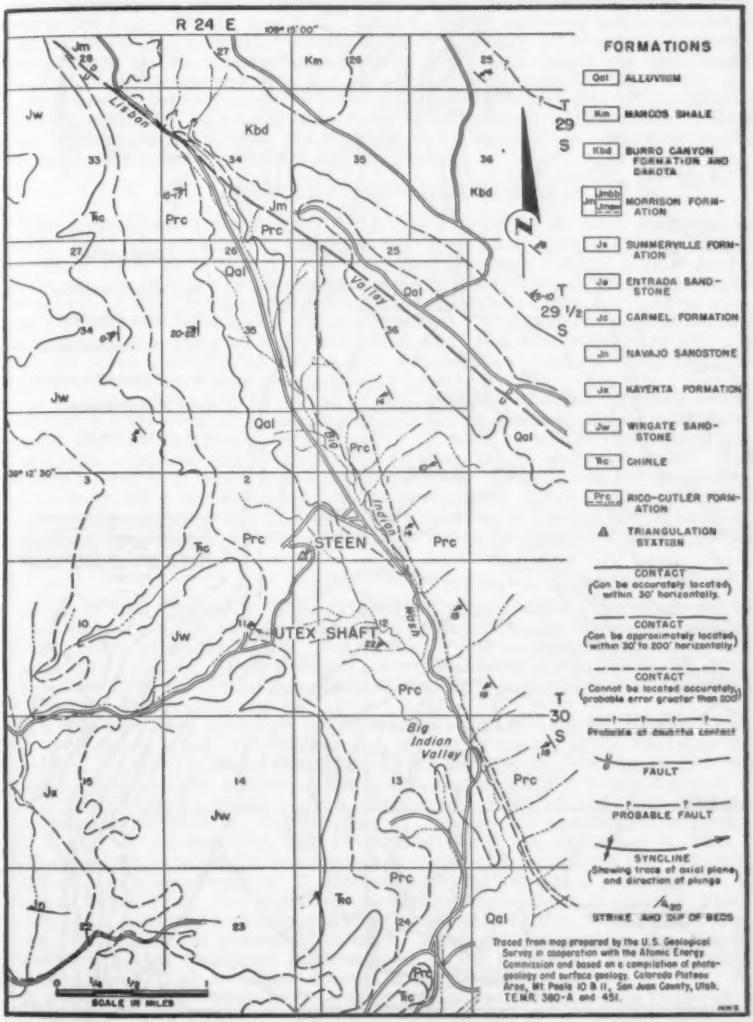
SCALE 2" = 1 MILE
Twelve company claims designated by heavy line.
H.H.S.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109° 15' 00"
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T 29 S
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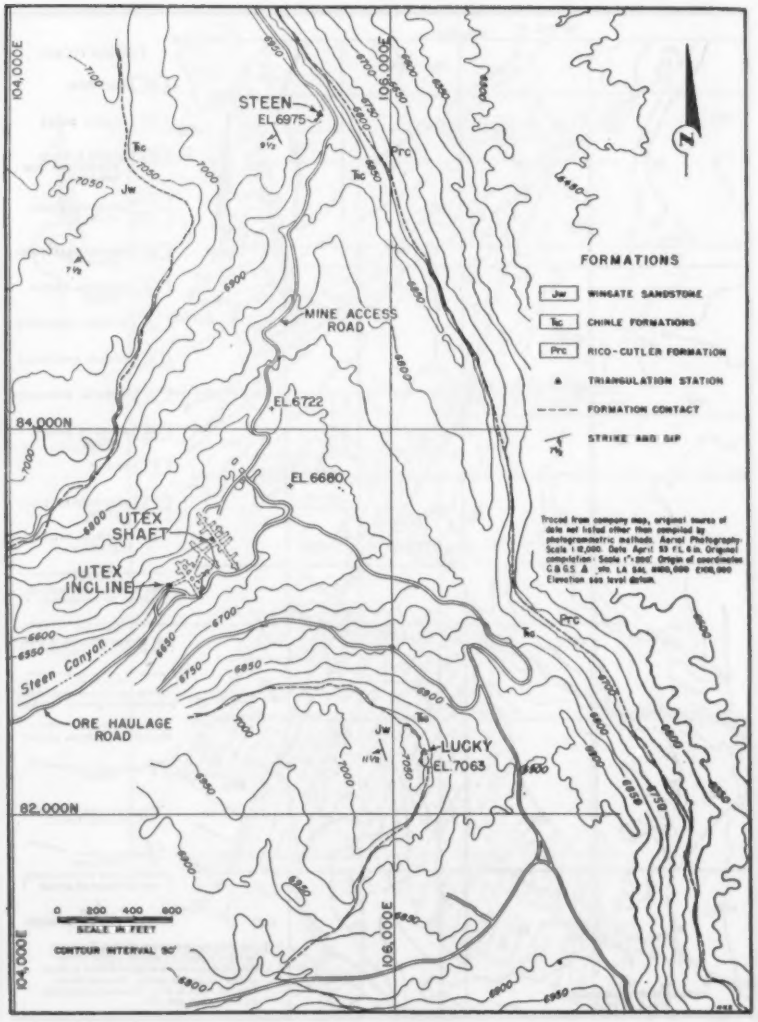
SCALE IN MILES
FORMATIONS
Qal ALLUVIUM
Km MANCOS SHALE
Kbd BURRO CANYON FORMATION AND DAKOTA
Jm MORRISON FORMATION
Js SUMMERVILLE FORMATION
Je ENTRADA SANDSTONE
Jc CARMEL FORMATION
Jn NAVAJO SANDSTONE
Jx KAYENTA FORMATION
Jw WINGATE SANDSTONE
Trc CHINLE
Prc RICO-CUTLER FORMATION
TRIANGULATION STATION
CONTACT (Can be accurately located within 30' horizontally.)
CONTACT (Can be approximately located, within 30' to 200' horizontally)
CONTACT (Cannot be located accurately, probable error greater than 200')
Probable or doubtful contact
FAULT
PROBABLE FAULT
SYNCLINE (Showing trace of axial plane and direction of plunge)
STRIKE AND DIP OF BEDS
Traced from map prepared by the U. S. Geological Survey in cooperation with the Atomic Energy Commission and based on a compilation of photogeology and surface geology, Colorado Plateau Area, Mt. Peale 10 & 11, San Juan County, Utah. TEI-NR. 380-A and 451.


STEEN
EL. 6975
MINE ACCESS ROAD
EL. 6722
EL. 6680
UTEX SHAFT
UTEX INCLINE
Steen Canyon
ORE HAULAGE ROAD
LUCKY
EL. 7063
84,000N
82,000N
104,000E
106,000E
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SCALE IN FEET
CONTOUR INTERVAL 50'
FORMATIONS
Jw WINGATE SANDSTONE
Tc CHINLE FORMATIONS
Prc RICO-CUTLER FORMATION
TRIANGULATION STATION
FORMATION CONTACT
STRIKE AND DIP

Settlements for the ore are made by the purchasing companies on the basis of the price schedule, bonus, and allowances set forth in Revised Circular 5 issued by the Atomic Energy Commission.

ACKNOWLEDGMENTS

Many members of the respective staffs of the Utex Exploration Co., the G. & G. Mining Co., and the Bureau of Mines contributed to the preparation of this information circular. Special acknowledgment of their courteous cooperation is due Dan O'Laurie, president; Allan P. Darby, assistant to the president; Oren L. Moore, mine superintendent; William A. Wood, underground foreman; and Mitchell Melich, general counsel, of the Utex Exploration Co., and Joseph N. Trudgeon, underground foreman of the G. & G. Mining Co.

Photographs reproduced were taken by H. K. Thurber, Jr., of the Mining Divison, region IV, Salt Lake City, Utah. H. D. Keiser, of the Bureau's Rare and Precious Metals Branch, Washington, D. C., assisted materially in coordinating the information presented in this circular.

## LOCATION AND PHYSICAL FEATURES

The mine of the Utex Exploration Co. is 39.1 miles, by road, southeast of Moab, Utah, on the Mi Vida claim, in the Big Indian mining district and in sec. 11, T. 30 S., R. 24 E., Salt Lake meridian, San Juan County, Utah. Access to the mine is 22 miles southeast from Moab by United States Highway 160, 7.7 miles east by Utah State Highway 46, 5.4 miles southeast by county gravel road, and 4 miles generally south by winding dirt road. The mine can also be reached by traveling 32 miles southeast from Moab on United States Highway 160 and then 8.8 miles generally northeast on a winding dirt road up Steen Canyon; this road is used by trucks transporting ore from the mine. (See figs. 2 and 5.)

Topography of the area is typical of the semidesert Colorado Plateau region, comprising a series of anticlines and synclines with the drainage forming steep-walled canyons and mesas capped locally by massive cliff-forming sandstone. Vegetation is sparse and limited to scrub pine, pinon, and sage brush. The climate is arid, with temperatures rising above 100° F. in the summer and falling to below freezing in the winter. Snows are usually about 6 inches deep but occasionally reach a depth of 2 feet. Dirt roads to the mines in the area are passable throughout the year, except after severe storms and during spring thaws.

## HISTORY

Early in 1951 Charles A. Steen, a geologist prospecting for uranium, staked 12 adjoining claims in the Big Indian mining district along the southwest flank of the Lisbon Valley anticline. (See fig. 3.) These claims, the Mujer Sin Verguenza, Mi Corazon, Besame Mucho, Pisco, Fundadoro, Te Quiero, Mi Vida, Linda Mujer, Mi Amorcita, Ann, Bacardi, and Mi Alma, comprise the property of the Utex Exploration Co.

A 4-mile road from the county gravel road was built into the property by Steen, who then moved in a drill rig and, on July 3, 1952, at the end of the road near the middle of the Mi Vida claim, began drilling the first diamond-core borehole in the district. The borehole encountered rich uranium ore on July 6 at a depth of 70 feet and continued in ore for 14 feet. Sinking of a shaft, 30 feet southeast from the discovery borehole, began on October 4. The first ore was hoisted on December 4. Ore shipments from the mine were begun on December 6, 1952.

The Utex Exploration Co. was formed on October 24, 1952, with Dan O'Laurie, of Moab, Utah, president; W. T. Hudson, Casper, Wyo., vice president; R. M. Barrett, Moab, Utah, vice president in charge of operations; Charles A. Steen, Moab, Utah, secretary-treasurer and chief geologist; and Mrs. Rosalie Shumaker, Moab, Utah, assistant secretary-treasurer. Steen and his mother, Mrs. Rosalie Shumaker, hold a 51-percent stock interest in the company. Mitchell Melich, attorney, Moab, Utah, is general counsel of the company.

A 2-year lease, dated February 11, 1953, was executed by the Utex Exploration Co., as lessor, with Archie Garwood, R. C. Gerlach, and W. E. Bozman, of Cortez, Colo., as lessees, who operate as the G. & G. Mining Co. The lease involves a 200-foot segment across the 600-foot width of the Mi Vida claim. (See fig. 6.)

## LABOR AND LIVING CONDITIONS

Bunkhouse facilities and board at the mine are furnished without charge by the Utex Exploration Co. to its mine employees. Most of the employees spend the weekends in Moab, Utah, with their families where they maintain homes. Em-

ployees of the lessee, G. & G. Mining Co., live in their own trailer houses near the mine on a site provided by the Utex company. Labor supply and working conditions are good; labor turnover is low.

## GEOLOGY [4]

### *Structure*

The Big Indian mining district is on the southwest flank of the Lisbon Valley anticline. (See figs. 4 and 5.) The anticline plunges northwest, and the ore-bearing horizon plunges under a considerable thickness of Jurassic and Cretaceous sediments. The Lisbon Valley anticline is a salt structure, and its subsequent collapse is thought to have been caused by solution and stoping of sale under the crest of the anticline.

Lisbon Valley, to the east of the Big Indian mining district, rests on the collapsed portion of the anticline. Separating Big Indian wash from Lisbon Valley is the Lisbon Valley fault. It is a normal fault that strikes northwest-southeast, paralleling the axis of the anticline. The displacement resulting from the fault has placed the Hermosa limestone (Pennsylvanian) against the Dakota sandstone (Cretaceous). The fault zone is mineralized with copper.

The Hermosa limestone escarpment on the east side of Big Indian wash dips 22° southwest. Across the wash the cliffs dip 15° southwest. Three miles west of this point the southwest dip decreases, and the beds become horizontal.

### *Stratigraphy*

The formations in the Big Indian mining district range from Upper Pennsylvanian to Upper Cretaceous, but formations younger than the Wingate sandstone and older than the Cutler are irrelevant to this discussion. The formations making up the west escarpment of Big Indian wash are the Cutler (Permian), Chinle (Triassic), and Wingate (Jurassic). Uranium mineralization is found in both the Cutler and Chinle formations.

The Cutler formation in the area consists of fine sandstone, discontinuous lenses of coarse-grained arkosic sandstone, siltstone, and mudstone. It is essentially a redbed unit. The source of the Cutler is generally considered to be to the east, and the Cutler becomes coarser from west to east. The coarse arkosic sandstone units contain granite, orthoclase, and quartz pebbles in abundance. They are mineralized with uranium and vanadium in the form of concretions and fine disseminations. No fossil wood nor carbon is found in the Cutler formation in this district.

The Chinle formation in the area consists of variegated mudstones and siltstones, intraformational conglomerates, and fine- to medium-grained, crossbedded sandstones. The upper part of the Chinle is chiefly a redbed series of mudstone, siltstone, and fine-grained sandstone. Silicified fossil wood abounds in the upper part of the Chinle. The ore-bearing unit contains fossil flora replaced by pyrite or uraninite, or preserved as carbon. The Chinle formation is distinguished from other formations by its variable color and content.

The Moenkopi and Shinarump formations are not present in outcrops in the immediate vicinity of the operations of the Utex Exploration Co. In places throughout the region, the Moenkopi was completely eroded from the crests of structural upwarps before the overlying rocks were deposited (McKnight, 1940). The Shinarump conglomerate is absent due to nondeposition or subsequent erosion. It is known, however, that the Shinarump pinches out to the west in Indian Creek. The post-Cutler and post-Moenkopi unconformities are significant in explaining the absence of the two formations.

A question arises over whether or not the uranium-bearing conglomerates, sandstones, siltstones, and mudstones placed in the Chinle formation are actually the Shinarump conglomerate. McKnight describes the Shinarump as bearing pebbles of well-rounded quartz, quartzite, and chalcedony. Other workers describe the Shinarump as being a basal conglomerate overlying the Moenkopi formation. In the Big Indian mining district the conglomerates are limestone conglomerates with siltstone and mudstone pebbles. The lithology is identical to that of the Lower Chinle. Also the ore-bearing unit is not a basal conglomerate but is underlain by Chinle siltstone and mudstone units.

### *Theory of ore deposition*

*Channel theory.*—The continuity of mineralization in the Lower Chinle has been projected by mining and drilling operations for approximately 3 miles

[4] The section on geology, with the exception of the anticlinal theory of ore deposition, was prepared by George P. Dix, Jr., field geologist of the Utex Exploration Co. Charles A. Steen, chief geologist of the company, presents the anticlinal theory.

from a rim outcrop south of the Big Buck 11 claim (which adjoins the Ruby Bell claim on the north; see fig. 3) to the Mamie claim in the northern part of the area. The trend line runs roughly from the rim outcrop of the mineralized zone to the Utex mine on the Mi Vida claim on a bearing of N. 30°–35° W. North of the mine the trend continues for one-half mile on that bearing and turns gradually to a bearing of N. 20° W. To connect the rim outcrop with the Mamie claim, mineralized drill holes are on the Sue Fraction, Ann, and Linda Mujer claims and the Utex mine on the Mi Vida claim. North of the mine are drill holes on the Fundadora, Pisco, El Paso, and Mamie claims. It is hypothesized that the trend is the axis of a Chinle channel.

Evidence of a channel and scouring is abundant. Lineation gathered from crossbedding, ripple marks, and streaming indicates that the axis of the channel is approximately N. 30° W. It is also evident that there is an abrupt thickening of the ore-bearing unit around the Utex mine on the Mi Vida claim. On the Fundadora and Pisco claims a fence of drill holes cuts the trend normal to the axis. There was a difference in elevation of the Cutler-Chinle contact of more than 50 feet in 100 feet of lateral distance after correction for dip. In other words, there was a 50-foot scour into the Cutler formation and a thickening of the ore-bearing unit. The lithology in the vicinity of the channel axis supports the channel theory. There are crossbedded sandstones and poorly sorted conglomerates that suggest swift water. Carbonaceous trash abounds along the axis. East and west of the channel axis thick beds of siltstone and mudstone are found, and the ore-bearing unit is thin.

It is not suggested that the uranium concentrated in the channel was detrital. Rather, the channel with its porous sandstone and poorly sorted conglomerate and variable lithology was a favorable host for later uranium solutions introduced into the Chinle formation. The abundance of carbon to trap and precipitate uranium from mineralizing solutions is another favorable element. Throughout the region carbon has played an important role in concentrating uranium. In the Utex mine uraninite of 87.55 percent $U_3O_8$ was found to replace vegetal trash. The variable lithology of a channel provides favorable traps for uranium solutions, and uranium is often concentrated in a permeable unit between two impermeable units. The rock underlying the scour is impermeable siltstone and mudstone and would tend to reduce abruptly downward migration of mineralizing solutions. It is apparent that the mineralizing solutions have been selective. In the Utex mine there is a large concentration; in other parts of the channel the mineralization is weak, but is continuous along the trend.

The origin of the mineralizing solution remains obscure. The solution could have been either ground water or a hydrothermal solution. Uraninite has been synthesized at 50° C. and can be made at a lower temperature in the presence of pyrite. Pyrite is found in close association with uraninite in the Utex mine. It is then apparent that the mineralizing solution could be either hot magmatic water from the nearby La Sal Mountain laccolith or ground water. The Lisbon Valley fault is an unlikely source for uranium solutions because it contains abundant copper in the fault zone, and there is only a minute amount of copper in the Utex mine. Ground-water activity is in evidence throughout the mine. It has migrated along fractures, sometimes creating vugs in mudstone. The fracture planes and vugs are coated with tyuyamunite. This ground-water action is very recent, however.

In summary, the channel theory is suggested by thickening of the ore-bearing unit and scouring into the underlying Cutler formation. The channel provides a favorable host for the mineralizing solution. Carbon plays an important role in concentrating uranium. The mineralizing solution was either hydrothermal or ground water or possibly a combination of the two.

*Anticlinal theory.*—The most disputed point relative to the uranium deposits of the Colorado Plateau is: When and how did these deposits reach their present location? There is no doubt about a real lack of research from which an intelligent answer to this question may be evolved.

One hears about a detrital origin from a large land mass containing traces of uranium; about surface waters carrying uranium in solution to an environment where an effective precipitant was present; about relations to the large late-Cretaceous to early-Tertiary intrusive masses of the Plateau region. The writer (Charles A. Steen) believes that the last-mentioned concept accounts for the origin of the uranium deposits, no matter where and how they are now found. Age determinations made recently argue against the ore bodies being contemporaneous with deposition of the host sandstones.

All ore bodies with which the writer is acquainted show that structures favorable for oil reservoiring played an important role in localizing the uranium of the Colorado Plateau. The Temple Mountain and Big Indian areas are good examples. The writer knows of no ore deposits, nor has he heard of any, occurring in synclinal areas. All deposits with which he is acquainted are well up the flanks of monoclines and anticlines. The greatest concentration of ore in the Utex mine, Big Indian area, is 1,500 feet down dip from the rimrock, in basal sandstones of the Triassic Chinle formation that are conglomeratic in many places. Width of the ore dipwise is 1,000 feet plus. At the mine, elevation of the top of the ore body is 6,585 feet and elevation of the bottom 6,570 feet. On the Mamie claim, 3 miles northwest of the Utex mine, the elevation of the top is 6,538 feet and that of the bottom 6,520 feet. Other smaller ore deposits have been found at the same elevation on the flank of the anticline. This indicates that the ore body follows the strike of the beds along the flank. The fact that the majority of uranium claims are in areas covered by oil leases is significant.

Nearly all, if not all, of the important uranium deposits are found in the freshwater deposits of the Morrison (Upper Jurassic) and the Chinle (Lower Triassic). These formations were deposited at a time of heavy vegetation and abundance of animal life. Why did the uranium solutions lose their uranium here and select such beds as a host?

### MINERALOGICAL DATA

Five selected samples, taken from different areas of the mine, were forwarded to the Bureau of Mines Metallurgical Division, Salt Lake Experiment Station, Salt Lake City, Utah, for mineralogical study. Results of spectrographic and microscopic examinations of the samples follow:

*Spectrographic examination*

Spectrographic results show that all five samples contain Na, K, Cu, Mg, Ca, Al, Ti, Si, Pb, V, U, Mn, Fe, a trace of Ga, and a trace of Ni. In addition, sample 1 contains Te, Zr, and Mo. Sample 2 contains traces of Zr, Mo, Te, and Co. Sample 3 contains traces of Zr, Mo, and Te. Samples 4 and 5 contain traces of Zr and Mo.

*Microscopic examination*

Microscopic examination [8] of the five samples shows that the host rock in each is sandstone composed chiefly of rounded quartz grains and small amounts of microcline and other minerals. The uranium and vanadium minerals occur in a cementing material between the grains. The two principal uranium minerals are the yellow tyuyamunite and the soft black or dark gray altered uraninite. The tyuyamunite contains vanadium; however, most of the vanadium occurs as a vanadium-aluminum silicate similar to an unnamed amorphous gray mineral found in other ores of the plateau, which has an index of refraction of 1.60 to 1.62. Vanadium also occurs in sample 2 as vanoxite in the form of black bladed crystals in the cementing material. A small amount of pyrite is present in all samples and a small amount of galena occurs in samples 2 and 5. A minor amount of purple fluorite, less than 1 percent, also occurs in all samples. The dark color of the samples is attributed chiefly to the dark uranium and vanadium minerals and not to carbonaceous material, since the organic carbon content of the samples is very low. Chemical analyses of the samples follow:

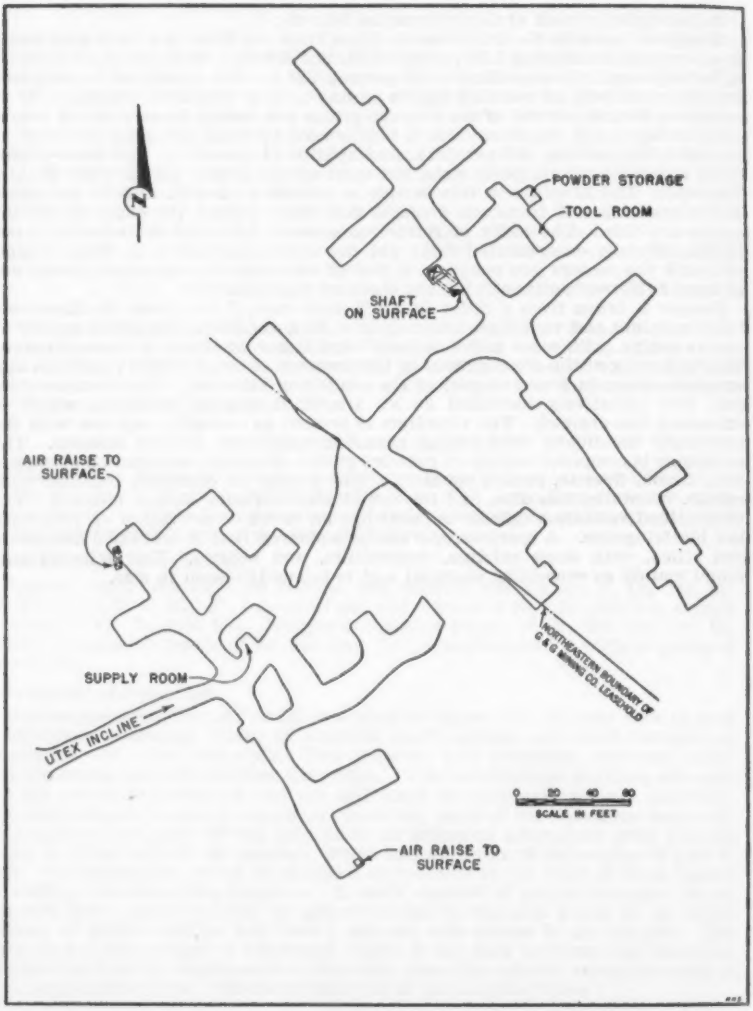
| Sample No. | Percent | | | |
|---|---|---|---|---|
| | $U_3O_8$ | $V_2O_5$ | $CaCO_3$ | Organic carbon |
| 1 | 1.93 | 0.15 | 0.1 | 0.22 |
| 2 | 4.38 | 6.40 | 24.8 | .35 |
| 3 | 2.81 | 5.80 | .43 | .14 |
| 4 | .91 | 1.50 | 9.5 | .48 |
| 5 | 11.1 | 2.4 | 31.4 | .59 |

[8] By H. L. Gibbs, metallurgist, and E. G. Irwin, petrographer, Metallurgical Division, region IV, Bureauof Mines, Salt Lake City, Utah.

A description of each of the five samples follows:

Sample 1, taken in No. 2 drift west, 1 foot from the floor, is a dark-gray sandstone-type ore containing 1.93 percent $U_3O_8$, but differing from the other samples in having very little vanadium (0.15 percent $V_2O_5$). The sandstone is composed for the most part of rounded quartz grains loosely cemented together. It is estimated that 85 percent of the rounded grains are quartz, 10 percent are microcline feldspar, and the remainder is represented by small amounts of zircon (1 percent), tourmaline (0.5 percent), and apatite (1 percent). The sand grains cover a fairly long range of sizes, but most of the grains are between 48- and 100-mesh. The uranium in this sample is present as a soft, altered uraninite. It is dark gray and transmits greenish-gray light around the edges where the grains are thin. The index of refraction exceeds 1.74, and the mineral is isotropic. Strong, concentrated light did not reveal inclusions in these grains, although the centers are opaque. A few of these altered uraninite grains are as large as 65-mesh, although most of them are much smaller.

Sample 2, taken from a pillar in No. 2 drift west, 3 feet from the floor, contains uranium and vanadium minerals in a dark sandstone composed mainly of quartz grains, with some sulfide minerals and minor amounts of other minerals. The dark color of the ore is caused by the presence of considerable vanadium and uranium minerals found as part of the cementing material. The uranium mineral was tentatively identified as an altered dark-gray uraninite, which is extremely fine-grained. The vanadium is present as vanoxite, together with the previously mentioned unidentified vanadium-aluminum silicate mineral. The sandstone is composed mainly of rounded grains of quartz, with grains of muscovite, zircon, fluorite, pyrite, sphalerite, and galena all cemented together with calcite, uraninite, vanoxite, and the vanadium-aluminum silicate mineral. The unidentified vanadium silicate mineral has an index of refraction of 1.60, with low birefringence. A spectroscopic analysis showed that it contained aluminum and silica, with some calcium, magnesium, and sodium. This mineral was found mainly as cementing material and is minus-100-mesh in size.




Sample 3, taken from the north face of No. 2 drift east, 10 feet from the floor, is composed, megascopically, of a dark-brown sandstone, with bright-yellow mineral between the grains of sand. Microscopically, this ore contains sand grains of quartz, feldspars, muscovite, zircon, and fluorite, cemented together with calcite and a vanadium-aluminum silicate mineral, tyuyamunite, and probably uraninite. The bright-yellow mineral is a calcium-uranium vanadate optically identified with the aid of chemical analysis as tyuyamunite. The sand grains, which are mainly quartz, compose approximately 70 percent of the sandstone. The cementing material comprises the remaining 30 percent and is chiefly the vanadium-aluminum silicate mineral, with included fine-grained uraninite.

Sample 4, taken from the base of a pillar in No. 1 drift west, is a light gray sandstone containing quartz, feldspars, muscovite, calcite, tyuyamunite, and

minor amounts of hornblende, tourmaline, and apatite. Thin sections of this ore show that it is composed chiefly of quartz grains, mainly 65 to 100 mesh in size, cemented with calcite, tyuyamunite and the vanadium-aluminum silicate mineral. The uranium is mainly present as tyuyamunite.

Sample 5, taken in No. 1 drift west, 2 feet from the floor, is also a sandstone, which is dark brown to black and contains quartz, calcite, feldspars, galena, pyrite, fluorite, tyuyamunite, uraninite, and the vanadium-aluminum silicate mineral. Thin sections show that the uranium minerals, the vanadium-aluminum silicate, and the calcite are the cementing materials of the sandstone. The sand grains are chiefly quartz and feldspars ranging in size from 48 to 400 mesh. A polished thin section shows small grains of galena throughout the ore and a small amount of minus-600-mesh corroded pyrite grains. An X-ray powder pattern was made on a radioactive concentrate and the exposed pattern was that of uraninite. Uraninite is probably the main uranium mineral in this sample, associated with lesser amounts of tyuyamunite, the yellow calcium-uranium vanadate.

### EXPLORATION AND DEVELOPMENT

Initial exploration was by diamond drilling on the Mi Vida claim, in Steen Canyon. After the first diamond-drill hole encountered ore, four additional holes were drilled to test the extent of the ore body.

Favorable results of exploration led to formation of the Utex Exploration Co. and plans for development of the ore discovered. An 8- by 8-foot timbered shaft, inclined 83° southeast, was begun in October; ore was encountered in the shaft at a depth of 70 feet in December 1952.

Mining operations from the shaft soon established the nature and apparent size of the ore body. Arrangements were then made looking toward development by an inclined adit large enough to permit the use of mechanical haulage underground. Under the terms of the lease executed with the G. & G. Mining Co., the lessee agreed to drive such an adit from a point about 400 feet southeast of the shaft to the ore body or productive horizon, and to continue the adit to the shaft. Driving of the adit, 10 by 10 feet in minimum cross section and at a downward inclination of 15°, was begun in March and completed in May 1953; it is used jointly by the Utex Exploration Co. and G. & G. Mining Co. for access and ore haulage.

Underground development is carried out by a modified room-and-pillar system with 50- and 100-foot intervals. Although headings are driven 12 to 15 feet high, ore remains in the back and bottom of the workings in certain places inasmuch as the thickness of the ore varies between 10 and 23 feet.

Additional exploration by diamond drilling has been accomplished by the Utex Exploration Co. on several of its claims. Most of this drilling has been in adjacent canyons or areas where depths to the ore horizon are at a minimum.

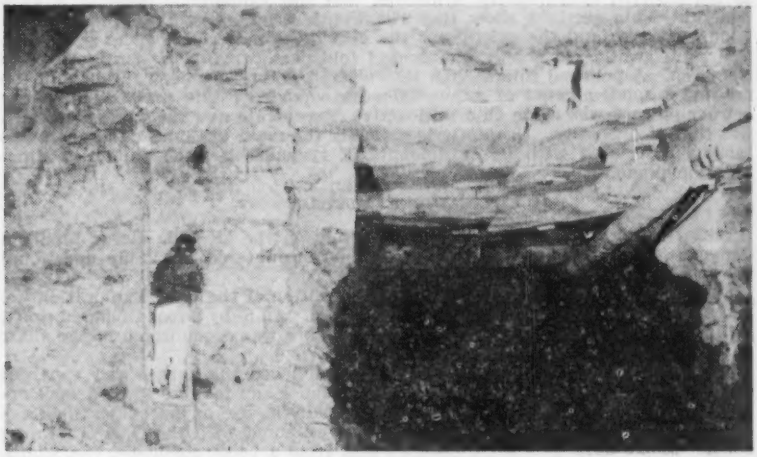
### MINING METHODS AND MINE PLANT

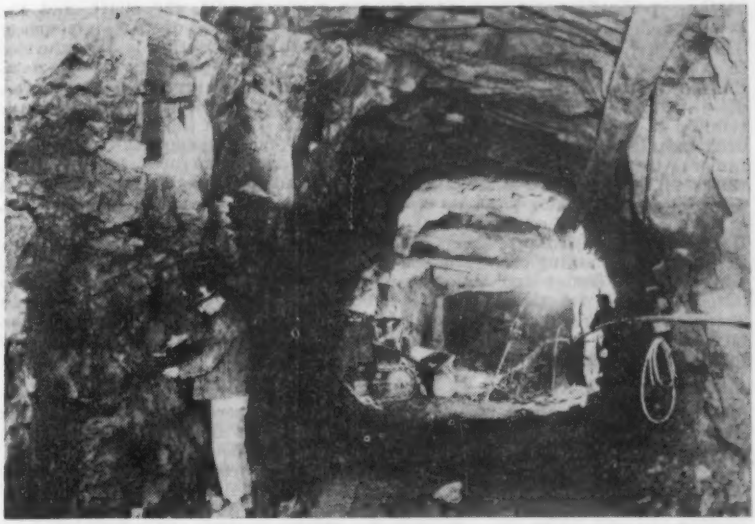
The substantial width and thickness of the ore deposit have made feasible a modified room-and-pillar method of mining. With the exception of the driving of the inclined adit, all mining has been in ore and has not progressed beyond the stage of drifting; no rooms or stopes have been started.

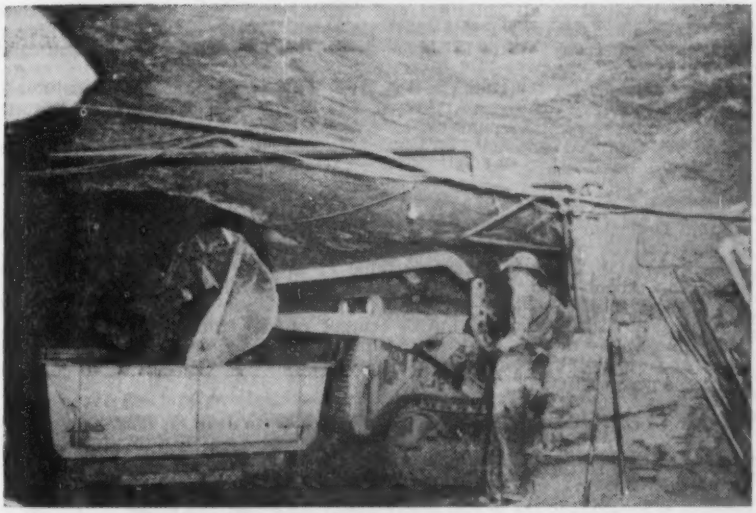
Although thickness of the ore varies from 10 to 23 feet, drift headings measure about 12 by 12 feet in cross section. A drift round averages 50 holes, and 2 miners drill a drift round in 5 to 6 hours. Four miners are engaged in drilling ore. Six-foot drill steel is used, and the rounds break to a depth of 5½ feet, yielding about 60 tons of ore. Jackleg or pusher-type drills and Sandvick Coromant steel, with tungsten carbide chisel bits, are employed. Company experience has indicated that this steel is economical; although a new piece will break occasionally, 2,000 to 3,000 feet of drilling can be expected from each piece with proper care and grinding. Compressed air is delivered to the various mine headings through 3- and 2-inch pipelines that extend from the surface into the mine through the shaft and 6-inch-diameter boreholes. Water is piped underground by gravity through the shaft and boreholes.

One miner, employed specifically as a powderman, does all loading and blasting. Approximately 3 boxes or 150 pounds of 30-, 40-, or 45-percent dynamite are used to blast a drift round of 50 holes. Electric detonators, with delay intervals of 1 through 10, are used. The blasting circuit includes an underground safety switch near the shaft, and from there the main leads extend through a separate borehole to the blasting switch on the surface.

Broken ore is loaded underground with an International TD–9 tractor Load-over and then hauled to the surface and dumped on the ore stockpile with a GMC diesel-motor tandem truck. Both of these units, for underground use, are equipped with water scrubbers on the exhaust. An International TD–9 tractor, with a Bucyrus-Erie dozer-shovel end loader, is used to load ore from the stockpile into trucks for transport to the ore-buying stations.







The mine shaft, which now serves only as a manway and pipeway and for the transport of supplies underground, is timbered; virtually no other timber is used in the mine. Roof bolts on a 4-foot spacing pattern are used in the backs of drifts, and their use is contemplated in future in the backs of rooms and stopes. In part of the mine a sandstone bed, 12 to 18 inches thick, lies directly above the ore; this bed, however, lenses out, and a nodular mudstone bed overlies the ore in the remainder of the mine. The mudstone spalls around the roof bolts, requiring some resetting of bolts and the setting of additional bolts, operations that result in a more costly spaced pattern. Two miners are engaged in roof bolting throughout each shift.

Natural ventilation is provided by the inclined adit, the shaft, and two 4- by 4-foot raises driven to the surface from the ends of two development drifts in the south section of the mine. Forced-air ventilation is also provided from the surface through an 18-inch Hillcore metal-vent pipe that extends down the shaft from a Coppus Ventair TP–9 blower driven by a General Motors diesel engine. After the vent pipe reaches the mine level, its diameter is reduced to 12 inches and the piping extended into each of the main development drift headings. Recently a 42-inch-diameter, 4-blade, propeller-type exhaust fan was installed in a wooden housing erected on the surface over one of the raises. The fan is driven by a ¾-hp. electric motor connected by a V-belt. A trapdoor in the housing prevents damage to the fan by concussion from blasting.

Mining operations of the G. & G. Co. are almost identical with those of the Utex Co., described above, except for a closer spacing of drifts (see fig. 6) and the method of hauling ore. The lessee company uses a Caterpillar HT–4 diesel with a shovel loader and hauls the ore with a 2-wheeled trailer pulled by a Caterpillar D–2 tractor. The trailer, built locally, is equipped with 8.25- by 20-inch rubber tires and has a capacity of 4 tons. Ore is stockpiled on the surface and loaded into trucks with a Caterpillar D–4 traxcavator for transport to the ore-buying stations.

*Surface plant*

In the relatively short period since its mining operations began, the Utex Exploration Co. has constructed a surface plant that includes 3 bunkhouses, a boarding house, modern change house, shop, and warehouse.

A 7.75-kw. generator driven by a diesel engine furnishes power for electric lights in all surface buildings and in the mine, as well as power for mine ventilation, for the charging panel for electric cap lamps, and for the walk-in cooler and refrigeration at the boarding house. It also provides electric lighting for employee-owned trailers at the mine.

Water is piped to all buildings and underground from a 5,000-gallon steel water tank along the canyon side above the camp. Water consumption averages 2,000 gallons per day; water is hauled from Moab, Utah, in a 1,000-gallon tank truck.

Compressed air for the Utex Co. is supplied by a skid-mounted, Ingersol-Rand, Gyro-flo 600, rotary compressor. The G. & G. Co. has two 210-c. f. m. Le Roi Air Master compressors, interconnected by a popoff system.

The well-equipped shop makes it possible to make most repairs of equipment at the mine.

## ORE PRODUCTION

From December 1952 to July 15, 1953, ore production from the Utex mine, as reflected by ore-settlement sheets received by the Utex Exploration Co., totaled about 16,000 short tons (see table 1) averaging 0.51 percent $U_3O_8$ and 1.26 $V_2O_5$. About 4,400 tons or 27 percent of the total contained 3 percent or less $CaCO_3$. The remainder (11,600 tons or 73 percent of the total) averaged 12.26 percent $CaCO_3$, and the $CaCO_3$ content ranged from 4.1 to 19.8 percent. Ore shipments by the lessee, G. & G. Mining Co., during the period represented about 41 percent of the total and averaged 0.59 percent $U_3O_8$, 1.21 percent $V_2O_5$, and 14.90 percent $CaCO_3$.

TABLE 1.—*Production of Utex mine, December 1952 to July 15, 1953, as recorded on ore-settlement sheets*

| Month | Ore shipped, dry short tons | $U_3O_8$ content, pounds | $V_2O_5$ content, pounds | Grade of ore, percent | |
|---|---|---|---|---|---|
| | | | | $U_3O_8$ | $V_2O_5$ |
| December 1952 | 16,204 | 192 | 734 | 0.59 | 2.26 |
| January 1953 | 554,184 | 3,720 | 13,097 | .34 | 1.18 |
| February | 1,329,921 | 15,322 | 46,094 | .58 | 1.73 |
| March | 1,678,998 | 16,203 | 50,175 | .48 | 1.49 |
| April | 1,988,099 | 21,527 | 57,415 | .54 | 1.44 |
| May | 2,374,934 | 22,474 | 53,446 | .47 | 1.13 |
| June | 4,864,394 | 50,804 | 111,243 | .52 | 1.14 |
| July 1–15 | 3,161,765 | 32,331 | 68,619 | .51 | 1.09 |
| Total | 15,968,499 | 162,582 | 400,823 | .51 | 1.26 |

Ore is transported by trucks from the mine over a winding 8.8-mile road down the bottom of Steen Canyon in a generally southwest direction to U. S. Highway 160 and thence (1) 25 miles south over U. S. Highway 160 to the ore-buying station at Monticello, Utah, operated by the American Smelting & Refining Co. for the Atomic Energy Commission; (2) 69.6 miles northwest over United States Highway 160 to the ore-buying station at Thompson, Utah, operated by the United States Vanadium Co.; or (3) 69.6 miles to Thompson and thence 82 miles east over United States Highway 50 to the plant of the Climax Uranium Co. at Grand Junction, Colo.

Settlements for the ore are made by the purchasing companies on the basis of the price schedule, bonus, and allowances set forth in Revised Circular 5 issued by the Atomic Energy Commission.

As indicated by the production statistics, the Utex mine reached the position of a 2,000-ton shipper of relatively high-grade uranium ore in the short period of 4 months. This is an outstanding achievement in the region and may be attributed to discovery of an unusual ore body and to its prompt development by the Utex Exploration Co.

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STATEMENT OF JOHN A. GARCIA, INSPECTOR OF MINES FOR NEW MEXICO

It is the consensus of opinion of the majority of small uranium producers in New Mexico that the system of determining bonus eligibility be changed to increase production of uranium.

Circular 6 states that the bonus plan is for the purpose of encouraging and assisting the development of new sources of domestic uranium production in the interest of the common defense and security. The bonus plan has gone far in accomplishing this purpose, but that certain modifications of the plan would make it much more effective and practical.

As it now stands, certification of a property for bonus is based on various tests which, in effect, are so indefinite that many certifications have to be treated as special cases and decided upon by the AEC on a basis of precedent and policy.

The effect of this situation is that an operator who is planning to open a new property often does not know whether his property will be eligible for bonus or not. Although bonus eligibility is often the deciding factor in determining whether it is economically feasible to open a new property. A decision by the AEC is usually not made until after the property is in production.

Most bonus certifications are now decided on a basis of ownership. This basis, in the opinion of many producers presents serious inequities. For example, if 2 outcrops 2,000 feet apart were on fee land owned by 1 person, the 2 outcrops would qualify for only 1 bonus. If these same outcrops were on separate parcels of fee land which were owned by different persons, the outcrops would probably be eligible for 2 bonuses. If these same 2 outcrops were on Federal land, and were staked by 1 person under contiguous claims, the 2 outcrops would be eligible for only a single bonus. However, if the outcrops were staked separately, they would probably be certified for separate bonuses. Of course, persons now staking claims make sure their claims or groups of claims are staked in such a manner so to allow for maximum number of certifications. But the unfortunate person with fee land or claims staked prior to the advent of the bonus system has no opportunity to divide his properties into a maximum number of bonus groups.

As a possible remedy it has been suggested that the AEC establish an arbitrary linear distance between producing mines as the principal basis for determining bonus eligibility.

The production bonus is a very important factor in the economics of uranium mining and is invaluable as a stimulus for exploration. Any clarification of circular 6 and any modifications of circular 6 to remedy its inequities would be helpful to the uranium industry.

A number of uranium producers wanted me to bring this matter to the attention of this committee. Also these producers want to make it very clear that their relationship with the AEC has been satisfactory in every respect. Remarks are offered as suggestions and not criticisms.

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The State of Utah fully recognizes the paramount importance of proper controls of strategic minerals so as to provide for the maximum use and availability

in our defense effort. These controls can be and should be imposed without further abridging the rights of the various land-grant States to the minerals in place underlying the school sections granted to the various States by the respective enabling acts. Any legislation considered or recommended by this committee pursuant to Resolution 143 should embrace provisions to guarantee the above grants to the various States.

Upon admission of Utah into the Union on January 4, 1896, the State was granted sections 2, 16, 32 and 36 for the support of the common schools within its borders. Although the enabling act did not specifically so state, it was interpreted by the Supreme Court as granting to the States only those school sections in place which were not known to be mineral in character at the time of admission of said State into the Union or at the time of survey, whichever date occurred later (*United States* v. *Sweet*, 245, U. S. 563). In order to guarantee the mineral title to the land-grant States, the 69th Congress saw fit to enact into law chapter 57, United States Statutes at Large, approved January 25, 1927, which specifically provided that the grant made by the enabling act was to include numbered school sections mineral in character, unless said sections were within the limits of existing reservations created by the United States.

Since the passage and approval of the above 1927 law, the administrative branches of our Government through a series of apparently related procedures have endeavored and succeeded in preventing the title to the States' lands and minerals apparently contemplated in the enabling act from passing to the several States involved. This statement is well illustrated by the following actual example which is representative of many similar procedures. On April 15, 1930, or 3 years after the passage of the above referred to 1927 act, which act reaffirmed the State's title to the minerals and mineral lands granted to it at statehood, the President of the United States by Executive order withdrew from lease or other disposal approximately 2,511,000 acres of public lands, termed in the order as oil-shale lands. This action effectively prevented the title of the State of Utah from attaching to the land in question. Subsequently in 1933 this original withdrawal was modified to permit the Secretary of the Interior to issue oil and gas leases under the General Leasing Act on the withdrawn land. The effect of this circumlocution was to prevent the Utah State title from attaching to the school sections in the withdrawn land, and despite the original grant at the time of statehood and the subsequent action of the Congress in 1927 kept the land, minerals, and consequent revenue therefrom in the hands of the Federal Government and diverted them from the support of common schools in Utah.

The 1927 act specifically referred to existing reservations, nevertheless, in spite of this congressional decree, by Executive order 3 years later 2½ million acres were withdrawn from the reach of the State's title and by subsequent modification of the withdrawal order were placed in the custody of the Interior Department with the power to lease, collect, and retain the revenues originally granted for the support of common schools in Utah.

The foregoing example is merely illustrative of one instance wherein by a withdrawal order and its modification the end result was the ultimate defeat of the intention of the original grant to public-land States and the expressed intent of the 1927 enactment of the Congress. The records are replete with instances wherein the major accomplishment of withdrawal orders and their modification has been solely to defeat the attachment of the title of States to its grant land. Normally the title of the States attaches to grant land upon the completion and acceptance of the survey of such public lands, and there are instances where withdrawal orders have been placed upon lands as long as 33 years after the survey and consequent attaching of the title of the public-land State.

It is earnestly urged that any recommendation of this committee and subsequent legislation toward the control of the production and use of strategic minerals shall also protect and guarantee to the public-land States and their schools that which was granted to them in their respective enabling acts and subsequently affirmed by Congress in the 1927 act.

*Production of Utex Mine, December 1952 to December 1953*

| Month | Ore shipped, dry short tons | Lime penalty | Total payment minus lime penalty |
|---|---|---|---|
| 1952—December | 152.30 | | $7,063.33 |
| 1953—January | 931.14 | | 53,174.97 |
| February | 1,780.83 | $1,434.96 | 96,267.19 |
| March | 2,189.77 | 2,896.05 | 127,778.58 |
| April | 2,357.74 | 6,282.45 | 120,903.48 |
| May | 4,002.00 | 10,553.09 | 237,519.53 |
| June | 4,087.90 | 11,225.92 | 205,016.20 |
| July | 3,624.15 | 8,646.80 | 174,736.83 |
| August | 5,095.21 | 11,704.19 | 236,816.41 |
| September | 7,469.20 | 14,910.63 | 342,723.15 |
| October | 6,725.03 | 19,409.34 | 241,748.47 |
| November | 6,883.82 | 26,750.98 | 319,209.21 |
| December | 7,243.71 | 22,592.61 | 218,383.77 |
| Total | 52,542.80 | 136,407.02 | 2,381,350.12 |

The CHAIRMAN. Mr. Rummel, I understand you are chairman of a special uranium committee of the Colorado Mining Association. Will you please identify yourself for the record and make any statement that you care to and any comments that you think will be helpful to the committee?

## STATEMENT OF G. T. RUMMEL, LA SALLE MINING CO., GRAND JUNCTION, COLO.

Mr. RUMMEL. I am G. T. Rummel. I have been in the business of mining uranium for the past 4 years. I operate under the name of La Salle Mining Co., with its offices in the First National Bank Building, Grand Junction, Colo. The La Salle Mining Co. is a partnership owned by four people—Mr. Roy M. Eidal, Mr. M. M. Hardin, of Albuquerque, N. Mex., and Mr. M. P. Rowe and myself of Grand Junction, Colo. I am also chairman of the Colorado plateau uranium committee of the Colorado Mining Association.

During these past 4 years, I have spent considerable time prospecting and looking at previously located properties in the area known at the Colorado Plateau, which I understand includes northern New Mexico and Arizona, southeastern Utah and western Colorado. At the present time, we are operating a mine approximately 3 miles south of the town of Uravan, and starting a new operation in the Greenriver area.

After one spends considerable time in the more remote sections of this Colorado Plateau, one cannot help but realize the great importance of roads to the production of uranium. There are many square miles of these remote sections where one can ride horseback for hours and see nothing but trails. Even the jeep cannot traverse these trails; however, we find rim exposures of uranium ore scattered through these sections. Some of these exposures have been filed on, others have not been, but none of them have had any development work done. These properties are owned by different individuals or companies and they feel, as individuals, that the gamble is too great to spend large sums of money on a road project, in addition to exploration costs, after they have reached their property with a road. The Atomic Energy Commission's access roads program has already developed several of these remote areas. I have watched two in particular where an access road was built into the Colorado River and the Greenriver areas. I

spent considerable time in these two areas before these roads were constructed. At that time one could spend a week in these areas and never see a soul unless a sheepherder passed through the country. Within 10 deays after these roads were completed, one could see 8 or 10 prospectors and geologists daily and claim corners scattered over the hills as far as the eye could see. Since that time, there has been considerable private money spent in developing ore bodies in these areas. I am sure the same thing has happened on all access roads.

Since the Atomic Energy Commission started this access roads project, they have spent $4,500,000 up to July 1953. I am of the opinion that it promotes private industry to develop for production, more ore per dollar invested than any other project. I would recommend that this access road program be, not only continued, but at least expanded in ratio to other programs set up to expedite present production.

The Atomic Energy Commission initiated a program for bonus payments on new production. There are people more qualified than I am for quoting figures on the result of this program, but I can assure you that the program is accomplishing its purpose and there are many miners in the area operating on this bonus that would not be operating otherwise and in considering possibilities in expanding present production a similar bonus could be considered.

### LIME PENALTY

At the present time, uranium and vanadium ores of high lime content cannot be sold without a lime penalty. Without going into details of this penalty, there are a lot of properties, especially in the southeastern Utah area, that are handicapped by this high lime setup. I am sure that the Atomic Energy Commission plus some of the milling companies have been working on a method to more efficiently handle this type of ore; however, as of this date, there has been no change in the policy of paying for this high lime ore. I am sure the removal of this penalty on high lime ores would greatly increase present production.

As chairman of the uranium committee of the Colorado Mining Association, I want to express our sincere thanks and appreciation to Senator Malone for his cooperation with the Colorado Mining Association, both in the field and in Washington, and also thank him for the work he did in securing the passage of the bill S. 1397. The system of leasing or granting permits by the Atomic Energy Commission for mining uranium ore on previously located oil and gas leases appears to be working entirely satisfactorily in those instances where it has been adopted; however, I am of the opinion that more study should be made regarding this problem and additional bills passed to completely clarify this situation.

Other members of the uranium committee of the Colorado Mining Association have either already testified or are prepared to testify more thoroughly regarding the confliction of uranium claims on previously located oil and gas leases.

Other members are also prepared to cover the tax problem quite thoroughly; however, I would like to touch on the subject lightly. I realize that this date and age every business has their tax problems but it appears that the Minerals, Materials, and Fuels Economic Sub-

committee might at some future date be desirous of stepping up uranium ore production. I am of the opinion that the tax problem would be a stumbling block in that program. The average uranium ore body is small when compared to copper, lead, zinc, and other metals. The uranium miner, due to present tax setup, finds himself in a peculiar position, in that his ore reserves are depleting faster than the tax laws would permit him to depreciate his equipment and the 15-percent depletion is not sufficient to cover tax losses and carry on a large enough exploration program to explore and develop new areas.

The Colorado Mining Association feels that the Atomic Energy Commission has done and is doing a splendid job in administering the entire uranium program. We realize that back in 1948 and 1949 the Atomic Energy office in Grand Junction, consisted of only 40 to 50 people. To date their organization is in the excess of 500 people. A growth of this kind in any organization will result in what is often referred to as growing pains. There will be unexpected problems arise and quick decisions made. The decisions are not always to the best of all concerned, however, we have always found that the local office has been ready and willing to cooperate, and try to straighten out problems brought to them.

The CHAIRMAN. Mr. Rummel, you refer to remote sections. Evidently you do not agree with some of the people over the past years who have said that all the ore discoveries have been made, there cannot possibly be any more, and therefore we must save the ore in this country and use foreign ores.

Mr. RUMMEL. I am sure they have not all been located yet.

The CHAIRMAN. You believe there are large areas in these mountain States that no one has ever seen intimately, except to fly over?

Mr. RUMMEL. That very few white men have been in these areas and prospectors have just scratched the surface.

The CHAIRMAN. I will say to you that the full membership of the subcommittee pays minute attention to all the testimony in the record, and will, I am sure, read all the testimony we receive here and elsewhere in our investigation. I have found them all cooperative. While only two of us are here today, I think you can count on the cooperation of all the members of the committee, providing they are convinced, as they were before, that further changes should be made or recommendations should be made to the Senate, to increase production of this important metal.

Do you have a question, Senator Murray?

Senator MURRAY. No questions.

The CHAIRMAN. Now it is after 5 o'clock. We have other witnesses, Vernon Pick, Frank Seymour, J. W. Cooper, Harold Worcester, Tom Newall, P. H. Mulcahy, Burt P. Newster, W. H. H. Cramner, Mr. Haldane who is president or head of the Uranium Ore Producers' Association, Leo Maley, Ray Sullivan, Robert Porter, and Michael Klein.

We will stand recessed until 10 o'clock in the morning, and it is then assumed that these witnesses will be called in the order they have been mentioned.

(Whereupon, at 5: 30 p. m., November 12, 1953, the instant hearing was adjourned to the following morning at 10 o'clock.)

# STOCKPILE AND ACCESSIBILITY OF STRATEGIC AND CRITICAL MATERIALS TO THE UNITED STATES IN TIME OF WAR

## Uranium

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**FRIDAY, NOVEMBER 13, 1953**

UNITED STATES SENATE,
SPECIAL SUBCOMMITTEE ON MINERALS,
MATERIALS, AND FUELS ECONOMICS OF THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Salt Lake City, Utah.*

(The subcommittee met at 10 a. m., pursuant to adjournment, in room 238, United States Federal Building, Salt Lake City, Utah, Senator George W. Malone (chairman) presiding.)

Present: Senators James Murray, member of the subcommittee; Jerome Adlerman, chief counsel for the subcommittee; George Holderer, staff engineer of the subcommittee.

The CHAIRMAN. The subcommittee will be in order.

I want to express my appreciation first to Mr. Jesse Johnson of the Atomic Energy Commission, and the witnesses who came here yesterday, most of whom are still here. I think the record being compiled here will be very helpful, both to the Atomic Energy Commission, and to the Senate committee.

I would like to ask Mr. Steen another question.

Now, Mr. Steen, you have given us a very clear exposé of the method of production of atomic ore. You know the objectives of the committee under Resolution 143, directing us to establish the availability of strategic materials for our expanding economy and for our security. How self-sufficient do you think this country and Canada could become in the production of our needed uranium materials if you were encouraged in the way you suggest over the next few years?

Mr. STEEN. I think with a marketing and tax structure to encourage exploration and production we can become self-sufficient in the Plateau Western States and Canada, without a question of a doubt. There is unlimited uranium yet to be discovered, and given the proper incentive we will find it.

The CHAIRMAN. And you do not agree with the previous prophets over the past few years, that all the exploration work has been done, that we must save what we have and import from the foreign countries?

Mr. STEEN. I do not agree. We should develop our own resources first, and we should make it a paying proposition so people will go out and risk their money.

The CHAIRMAN. And you think, just as the history of mining shows, that if an incentive is there, continual new reserves will be discovered, even faster than the production of them?

Mr. STEEN. Absolutely.

The CHAIRMAN. Thank you, Mr. Steen.

VERNON PICK

This morning we have Mr. Pick with us, a very important producer, Vernon Pick, from Grand Junction. Now, Mr. Pick, will you just identify yourself for the record, and then give us any information you think would be helpful to the committee? We will be very appreciative if you will.

## STATEMENT OF VERNON J. PICK, OF GRAND JUNCTION, COLO.

Mr. PICK. My name is Vernon J. Pick, Grand Junction, Colo. I am a prospector, mine owner and operator. For almost a year I spent my entire time prospecting in various parts of south central Utah. With trucks, planes and on foot I worked many of the remote areas of this region, searching for uranium outcroppings on the canyon walls and mesas of that part of the Colorado Plateau without success. I visited mines and talked to other prospectors and Atomic Energy geologists whom I met in the field. All of this contributes to my knowledge of the area and uranium know-how.

Finally, walking up the Muddy River Canyon in the southwestern corner of the San Rafael Swell I found the uranium outcrop which I staked out and have mined for the past year and a half.

TAX SYSTEM A HANDICAP

During this time I have had a chance to observe more of the mining activities on the Colorado Plateau than I had been able to while I was prospecting, and because my own mining experience had shown me how tax problems can handicap a miner and have the effect of reducing uranium production, I am now better able to understand the plight of others in this business.

From what I have learned, both from my travels around the plateau and from my own mining experience, I am convinced that the present tax system is, in a large measure, handicapping the efforts of the Government to increase uranium production.

Our Government, through the efforts of the Atomic Energy Commission, has done a remarkable job of pushing uranium production to its present high level. It has pioneered such modern prospecting methods as the Air-borne Scintillometer, drilled large areas, and has supervised the building of roads, both into new areas, as well as into older producing areas. They have done a great deal of work on the geology of the area and have mapped a large portion of it. I have been told that original exploration discovery and leasing by them has resulted in approximately 25 percent of the total uranium production on the plateau. There is no doubt, in my mind, that they have done a remarkably good job in rapidly expanding production, but they are being greatly handicapped by a tax structure over which they have no control.

I have talked to men who only mine a few months out of the year and vacation the rest of the time to escape the higher income-tax brackets. I have talked to others, and I belong in this group, who, although they mine the year around, are limiting their production for the same reason. This has several bad effects. In the first case,

men are thrown out of work for long periods of time during the winter months, making an additional drain on our economy through relief and unemployment payments. In the latter case this does not occur, but the economies that could be made through large-scale production are lacking, and the cost of production increased. Most important of all, perhaps, production of uranium ores, so vital to our defense efforts, is being slowed down.

Another incident within my own experience is a case in point. Wishing to expand my operations, now that I have one mine operating smoothly, I found another property which was for sale and looked as though it might be operated profitably. At the time I looked at it it was being mined in a small way by two men and a few tons or ore shipped weekly. It looked like it could be mined at a much higher rate with the expenditure of a little money and improved mining methods. I made a careful examination of the property and believed I could see enough ore to return the purchase price above the costs of production. Subsequent mining has proved this assumption to be true. Naively acting on this belief I purchased the property and started mining it. Now I find myself in this position: Because of my other mining operations I will be in about a 75-percent income-tax bracket and I must not only mine out enough ore from this mine to equal my original investment but must make a profit of about four times the purchase price in order to even recover my investment. There seems to be but one thing to do and that is to shut it down until I find myself in a lower income tax bracket, or some relief of another kind is found.

This state of affairs does not seem right to me when so much tax money is being spent through the activities of the Atomic Energy Commission to increase production.

Actually this whole thing seems to defy logic. I have purchased a piece of property the value of which is in excess of the purchase price. Now I find that due to taxes, I will have a very hard time ever getting my money back. To say the least, this has taken away my willingness to risk my time and effort and what capital I have after taxes to try to increase uranium production.

The cause of this condition seems to stem from a lack of understanding by those men who concoct our national tax laws as to the difference between an ordinary type of business and mining. In an ordinary business, run by an individual, the owner is interested in building his sales to the greatest volume possible. Even though the income tax may be higher with greater profits, his business, if taken proper care of, is capable of producing income indefinitely. In other words, there is ordinarily no reduction in the value of a business when a large profit is taken from it.

Mining is, however, an entirely different story. All ore bodies are limited in extent. Every ton of ore shipped reduces the mine in size and value and brings closer the day when there will be no more ore to mine, and a large volume of ore taken out means a shorter life to the mine. This has a particular significance when uranium mining is considered because of the limited size of the usual uranium mine. Often these mines are individually owned and the rate of mining is of considerable importance when income taxes are taken into account. As an example, take a mine producing 50 tons of ore a day, valued

at $40 a ton, or say 10,000 tons a year, making an overall gross income of $400,000 a year. If mining costs were 25 percent, or $100,000, and depletion of 15 percent or $60,000, the net income, before taxes, to the owner would be $240,000.

This sounds good, but even using the split income method of calculating income taxes for man and wife, the combined State and Federal tax rate is in excess of 90 percent and the tax approximates 50 percent of the gross value of the ore, or $200,000.

Now when you consider that this mine is worth $400,000 less at the end of the year, which in many mines might be a major portion of the ore body, you can readily understand why a man might want to limit his production so as to stay below the higher tax brackets. Considering the efforts being made by our Government to increase production of uranium ores, and the great amount of money being spent, to do this seems wrong.

I have been told that the only way to realize the maximum value from my mine is to sell it under a capital-gains plan. Study of this plan convinces me that this is true, but the idea of having to sell my mine to realize its full value irks me. I like to operate my mine. I want to continue owning it. Why should someone else come in and take a profit out of it? Less actual taxes will be collected if I sell it under a capital-gains plan than if some tax plan were worked out allowing me to mine it out rapidly and profitably.

### RECOMMENDATIONS FOR RELIEF

Several things could be done to relieve this situation.

First: The haulage and development allowances are not, at present, considered as part of our income when calculating depletion. This could be changed very simply.

Secondly: The depletion allowance could be raised from the 15 percent, now allowed uranium mining, to 27½ percent, or the same amount as oil is allowed. Because uranium mining is a hazardous, wildcatting venture, much the same as oil, making the depletion allowance the same would only seem fair and equitable.

Finally: If you really want to precipitate the greatest rush of productive activity in uranium mining you can conceive of I would suggest that what, I understand, is done in Canada be followed here. I have been told that each new mine in Canada is allowed 3 years of development and production free of all taxation. If all mines here were allowed these 3 tax-free years I am absolutely convinced that all your problems relating to self-sufficiency in uranium would disappear like magic and that within a year's time you would literally have uranium stockpiled all over the country.

In my own case I believe I could contribute 10 times my present production; others I know of would probably do as well. Risk capital, hesitant at present about putting their money into a hazardous uranium venture, would flow into the country in great volume. Drilling by private industry would expand at a great rate and many new producing areas would be found and developed. The murmur in the press, now caused by a few new finds, would quickly rise to a roar of feverish activity.

The CHAIRMAN. Mr. Pick, what you say is very interesting to the committee. It appears from a casual examination that foreign pro-

ducers, whether they are our own people mining in the foreign nations, or whether they are the foreign people themselves, have very little taxes to pay. It has even been suggested they write off all taxes.

As a matter of fact in Puerto Rico there is a special tax proposed, that if you are there a certain length of time and establish a residence for your business, you are exempt from income taxes.

That is correct, isn't it Jim?

Senator MURRAY. I believe it is.

The CHAIRMAN. I will make that statement subject to check, but I am sure it is true.

They wanted to be a State, and I was appointed 1 of 5 Senators on a subcommittee to explore Puerto Rico with their becoming a State in view, and we so recommended. I recall they have their own governor and legislature, and they were giving special concessions.

Now, if what you say is true, and I believe it is, we are handicapping our own production of strategic materials and minerals, and it not only applies to uranium but all strategic materials, minerals, and fuels. There are 77 on our investigative list. It appers to be very serious suggestion.

Is that the only suggestion you have, in modification of the income tax, to adopt the Canadian way of 3 years?

Mr. PICK. Either increasing the depletion allowance or allowing 3 years' time for development. Then there is no doubt in my mind but what uranium production would increase greatly in a very short time.

The CHAIRMAN. Every time a depletion allowance was argued for oil and gas or mining, or the 1934 Trade Agreement Act, I appeared before the House Ways and Means Committee and I appeared so many times that I think they began to believe I was a member of the committee.

There is a continual attack on the depletion allowance in oil and gas and mining. Now, where that attack originates, I am not able to say at the moment, although I have my ideas. I believe it is part of the general overall attack, starting with the 1934 Trade Agreements Act, to destroy the economy of the country, to destroy our economy through imports from the sweatshop labor nations, without any evener in wages and standards of living here and abroad, to make us dependent upon other nations across the ocean, and upon other nations for materials, minerals, and fuels without which we cannot fight a war and maintain our economy. At least it has had that effect. Whether anyone thought it through or not is a matter of individual conclusion after hearing the evidence.

Now, is there any other handicap to organizing and getting started in the mining business generally, like the Securities and Exchange Commission? There have been a good many comments about that. Since you have gone into business on your own, your opinion would be valuable.

Mr. PICK. Well, I haven't had any experience in that particular field that I could comment on, other than taxes. There are, however, a number of things that would help production. The roads into the area are very poor and because uranium is found in remote areas these access roads are quite important.

The CHAIRMAN. You are getting help on access roads?

Mr. PICK. Yes, an amount of it, but a great deal more is really needed. The cost of hauling ore is high because of the poor roads.

Even the best of the roads into that area are not paved, of course, and haulage costs are high.

The CHAIRMAN. What would you say of hauling ore 15 or 20 miles over dirt roads so that the loading and unloading is not too much of a factor? What is the approximate cost per ton-mile?

Mr. PICK. It is very variable because some roads are very bad. I would say it costs 12 to 15 cents a ton-mile. Others may be as low as 8.

The CHAIRMAN. If you get on a paved road for half of the time, it will cut the cost?

Mr. PICK. It will cut it down some.

The CHAIRMAN. What would you say on an ordinary dirt road for 15 or 20 miles?

Mr. PICK. Eight to ten cents.

The CHAIRMAN. That would be about the lowest?

Mr. PICK. Yes, it would.

The CHAIRMAN. What do you have to say about the grade of ore that is acceptable? In other words, I don't know there is any real limit on ore, but some say 0.10 percent. If that is a limit on acceptability, then it leaves a large amount of lower grade ore in the mine, which, of course, any miner knows you are not able to go back and get, and is lost forever. What do you have to say about the grade of ore accepted?

Mr. PICK. Ordinarily a person cannot mine economically grades much lower than 0.20. However, the Atomic Energy Commission does accept ore down to 0.10 percent.

The CHAIRMAN. What?

Mr. PICK. 0.10. And the cost of haulage would probably interfere with your mining this low-grade ore. I believe that there are quite large deposits of ore, even below this grade of 0.10 or ten one-hundreths of 1 percent, that could be mined if they were developed, and the haulage problem taken care of, either by building a mill nearby, or if the deposit were near an existing mill.

### DEFIES LOGIC

The CHAIRMAN. You spoke of investigating the profits you might make by selling to someone else. The question arose in my mind as to how the person you would sell it to would profit more than you could if you kept your mine. Would you explain what the situation is? What is that situation?

Mr. PICK. It becomes sort of involved as far as I am concerned. I haven't learned, I suppose, all there is to be known about it. But several propositions have been made to me by individuals who have companies already in existence. Say a company loses money. They would purchase this mine and I would then be able to take a capital gains tax of 26 percent instead of paying a high bracket income tax on its production. They would put it into, say, a corporation losing money, where the loss would cancel off the mine's profit, and as far as can be seen the taxes paid would be very small. In some cases there wouldn't be any. And there are a lot of other things that don't seem just right. As I said before, it sort of defies logic.

The CHAIRMAN. In other words, it is very like us doing farming on the Senate floor and not knowing much about farming. We set a tax,

but the people who are under the tax are also smart, and they must work one thing against another and do the best they can. Instead of promoting what we say we want, we are stopping it?

Mr. PICK. I am sure that is true.

The CHAIRMAN. If you think this thing over further—I think you brought up some very important points—and wish to supplement your testimony in any kind of brief you would care to, I think it would be very helpful to the Atomic Energy Commission, because they want production. I am sure of that.

Senator Murray?

Senator MURRAY. I have been listening very carefully to the testimony of the witness, and I think he is making some very valuable points here that require our very careful study.

It does seem to me very illogical that a man who has gone to all the trouble of exploring and discovering a mine should not be able to operate it at a fair profit, and that he should be compelled to sell out and take the capital-gains tax and let some other man come in and operate the mine who can charge off losses, and so forth.

It does seem to me that there are a number of matters here that the committee will have to study very carefully and come out with recommendations to aid the small producer. I am very grateful to the witness coming here this morning and giving us this valuable testimony.

The CHAIRMAN. Thank you, Senator Murray.

Now, I understand you didn't give us very much of an idea of the size of your operation. Would you mind telling us about what you are producing and what you think you could do if proper adjustments were made as you suggest?

Mr. PICK. We had an ore body, when we first started mining, of about 150 feet in length and probably 20 feet average depth. Up to the present time we have run drifts into it to a depth of almost 400 feet, and in two different places at the ends of these drifts we have branched out to what we call the face, so the limits that the drifts run to will probably run 450–500 feet in width. At no place have we been able to find the limits of the ore body. It is not a body that lends itself to drilling because of the great thickness of the overburden on top, so that the only way we have of determining its extent is to drift into it until, in some direction, we find its limits.

So far we haven't done that. I mean, we have tried, and we haven't reached the limit of it in any direction yet.

The CHAIRMAN. What is your rate of production?

Mr. PICK. About 50 tons a day.

The CHAIRMAN. About what does it run?

Mr. PICK. It has varied some. We have shipped some as high as 3.48 percent, and we have had a lower limit of about 0.31. I think the average is probably 0.48, forty-eight one-hundredths.

### WOULD TRIPLE PRODUCTION

The CHAIRMAN. What could you do in future production in the next 2 or 3 years, if you didn't run right into this tax bracket that made it imperative you slow down production?

Mr. PICK. What I could do and what I would do would be to rapidly expand my production. If I did that, if anything were done tomorrow, I would be able to put three shifts on, triple my production

inside of a week, without the addition of any equipment at all, and inside of probably a month or two I think I can double that again without any trouble. I believe that a matter of probably 5,000 tons a month would be quite easy to get in a very short time.

The CHAIRMAN. Are there other producers with a potential capacity in the same manner?

Mr. PICK. I have talked to individuals who say that they are limiting their production because their ore body, they know, is limited, and if they mine it all out this year they will be in a high tax bracket and will pay out such a great percentage of the mine's total value that they wouldn't end up with a great deal of money, so they will mine out a small amount each year, and some of them mine a matter of a few months and take a vacation the rest of the year.

The CHAIRMAN. And that, of course, makes employment seasonal?

Mr. PICK. Yes.

The CHAIRMAN. Senator Murray?

Senator MURRAY. No questions.

The CHAIRMAN. Thank you, Mr. Pick. You have been a very helpful witness, and will you supplement your testimony?

Mr. PICK. Where do you want me to send it to?

The CHAIRMAN. To the Senate Office Building.

We have a man here this morning who is a very close observer of the mining industry. The 30 years I have been in the engineering business I have known this man, and he speaks his mind. He is acquainted with most of the operations in the West, along with most of the operators and engineers of the West, and I would like to call this morning, Mr. Burt Brewster.

Mr. Brewster, if you will identify yourself for the committee, and just in your own way give the committee any information that might be helpful we will appreciate it.

You understand, of course, that what the committee is trying to do is determine the weak spots, so that this committee and the Senate might be helpful to the Atomic Energy Commission, and to the national defense program, and the Government generally in its war effort, and also in the production of this material for commercial purposes.

## STATEMENT OF BURT B. BREWSTER, SALT LAKE CITY MINING REVIEW

Mr. BREWSTER. My name is Burt B. Brewster. I am an engineer of mines. After 25 years in mining and mining equipment, I purchased the old Salt Lake Mining Review in 1934, with no profit motive involved, in the endeavor to champion the mining industry against what I considered then the unsound policies of the New Deal.

In that process I was called a neurotic, and various other sweet names, but my predictions came about.

Since the gentlemen of the committee have been getting into the basic uranium question, something occurred last night on the air which has a great bearing on our domestic industry in every direction. The Secretary of the Interior, in the face of this country being flooded with foreign second-grade oil and first-rate petroleum, some of which we need, and much of which we don't need, made the statement in a speech that he hoped nothing would be done to shut off any of the

foreign oil. Now, in view of this continuing disappointing attitude of the new administration, which seems to go along with the State Department's philosophy of selling us down the river, plus the President's deliberate blocking of the sliding scale today on lead and zinc, which would have saved that industry, and the subsequent ridiculous attitude of finding out what is the matter with an industry which anyone with eyes and ears knows is at the point of destruction, I wish to enter this statement for the record.

The promotion of world trade should be on the basis of fair and reasonable competition and must be done within the principle long maintained that foreign products of underpaid foreign labor shall not be admitted to the country on terms which endanger the living standards of the American workingman or the American farmer, or threaten serious injury to a domestic industry.

It is therefore suggested that the United States Congress is urged to resume its constitutional responsibility of regulating foreign commerce through the adjustment of duties, imposts, and excises through its agent, the Tariff Commission, and allow the 1934 Trade Agreements Act, the so-called Reciprocal Trade Act, which transferred such responsibility to the President, to expire in June of 1954.

May I add to that statement the fact that the one worlders, the internationalists, that seem to have more influence with the present administration than ever before, almost make the assertion that the cheap foreign labor is handicapped by the lack of equipment, and the facts of the matter are that the cheap foreign labor have the advantage of the most modern equipment in the world, plus not only the technical knowledge of American engineers, but floods of our own funds, some of which comes from the taxpayer's pockets.

Getting down to uranium, I have tried to be objective in my study of the history of radium, vanadium, and uranium.

The CHAIRMAN. Let me ask you first, Mr. Brewster, and I am interested in your testimony, is there any difference in the principles between mining the minerals of the Nation under a survival principle, and a principle with respect to the watch, the crockery and precision-instrument businesses or 500 other businesses of the Nation, like the cattle business? Cattle come from Mexico and Canada, and they would get all over our Western Hemisphere. You are shipping the wool from Australia, and have free trade on wool. Tell us if you think there is any difference.

Mr. BREWSTER. There is one major difference, since you can't close mines down and be ready to meet an emergency. You can shut off some of these things, no matter how harmful it is. You can shut off wool, and shut off oil, and things of that kind, but once you shut down our basic mining industry this country is in dire peril.

The CHAIRMAN. I don't want to argue the point, but just bringing it up for the record, let's take the precision-instrument industry.

It takes 4 or 5 years for a man to become a good man in the precision-instrument industry, and if that is practically shut down, like the watch industry, it takes quite a while to train a man to raise sheep, and to get into the crockery business, or any other business.

Mr. BREWSTER. There is no question about that, Senator, but I think that even in mining it is more serious. You take the man who is mechanically minded and has skillful fingers and switch him from

one precision manufacturer to another without such great dislocation, but as was testified yesterday, the miner of today is a highly skilled man, a highly skilled technician. He handles equipment that the miners of 30 years ago would be nonplused to see today. It goes beyond that. You close a mine down, and the engineering department is gone. The one worlders' idea that a mine is like a water spigot is ridiculous. There is no question but what it is very serious in other businesses, but I don't think it can be nearly as serious as it is underground. It is a different proposition.

The CHAIRMAN. Do you have any further statement to make Mr. Brewster?

Mr. BREWSTER. Yes, sir.

The present management of the Atomic Energy Commission, both at Grand Junction and other places, has wrought great changes. As those familiar with the situation will remember, it took about 2 years of vociferous protest by a group of miners who first appeared in Denver at a Colorado Mining Association convention, and exposed the ridiculous sampling methods of what some people call a monopoly in the vanadium and uranium business.

At the time Mr. Wimpfen was sent to Grand Junction, I predicted that if anyone could straighten some of the mess out, he could. Since Mr. Wimpfen arrived in Grand Junction, the little fellow is no more insulted than he used to be. He is not brushed aside the way he used to be. He is given a certain amount of consideration that before Mr. Wimpfen went to Grand Junction he did not get.

From this point on I wish to discuss the problem of a mill for the Steen properties.

We have heard Mr. Johnson and everyone connected with the Atomic Energy Commission state that the Government must have all the uranium it can get. The question of an independent mill under such circumstances seems quite academic to me. It is quite obvious that the second gushers and those that have enjoyed the monopoly, and I say at times in the past a cheating of the little fellow in the processing of ore, have very red faces over the Steen proposition.

Some of them have instituted the gossip that Mr. Steen is a little bit whimsey in the head, that he buys Cadillacs by the half dozen, that he isn't too sober. There have been numerous rumors and stories of that kind which I can disprove by personal investigation.

All this stems, in my opinion, from the desire of certain interests not to lose the monopoly they had on the little fellow's ore.

Now, if the Government wants all the uranium it can get, and if these people are now treating Steen ore, if the Government is taking his ore, there is no question about that ore being treated. That is a silly question about whether Mr. Steen has available the technical knowledge and the wherewithal, is entirely aside from the point.

Now, I have the greatest faith in the integrity of the Atomic Energy Commission, particularly the gentlemen who were here. But the Atomic Energy Commission, in the case of the Steen mill, is on trial. There are forces at work, without going into detail, that are moving heaven and earth to stop that mill. Officials of even a big mining company, they say they are going to do it, not Mr. Steen.

Now, in the face of proof of the proper kind of a mill for the grade of ore, that mill is not built as Mr. Steen still desires to build it. I say

the Atomic Energy Commission is guilty of blocking it or has been reached from other sources. Thank you.

The CHAIRMAN. Thank you, Mr. Brewster. Do you have any questions, Senator Murray?

Senator MURRAY. No questions.

The CHAIRMAN. Thank you, Mr. Brewster, and if you have any further information you think would be of value to the committee, you can send it to the committee in Washington.

Would Mr. Kline, of the Department of the Interior, come forward and have a seat here at the table?

Mr. Porter, I have mentioned in the last 2 or 3 days that I have heard through newspaper reports that there has been a rather important discovery made in Idaho, and some comment has been made about it. I understand you are the man who either made the discovery, or has the property at this time, and you are working out ways and means to handle the ore.

You have heard the testimony yesterday and this morning. If you can offer any suggestions you think would be helpful to the committee, we would be very appreciative. Will you go ahead in your own way now, and make any statement that you care to? Proceed.

## STATEMENT OF ROBERT PORTER

Mr. PORTER. Senator Malone and Senator James Murray, the reason I am appearing before this committee is to bring your attention to a new source of uranium ore plus other rare minerals, located in the State of Idaho, which new source we feel may have considerable bearing on production of uranium and other critical metals in time of war.

The CHAIRMAN. I am very intersted in those rare metals, too.

Mr. PORTER. The property is more specifically located 95 miles northeast of the city of Boise, Idaho, and known as Bear Valley in Valley County. The approximate elevation is 6,300 feet.

The Bear Valley project is for the mining of placer deposits of heavy black sands containing uranium, columbium, tantalum, thorium, rare earths, oxides, monazite, ilmenite, and zircon.

The CHAIRMAN. You realize, Mr. Porter, you are getting right into the middle of some of the very scarce materials.

Mr. PORTER. Yes, we do. We discovered this property in 1951, and we have been working on it since then for 2½ years in conjunction with the Bureau of Mines in the prospecting of the property and working on the recovery, the concentration and the metallurgy, and it is being done in our test pilot plant in Boise, Idaho, and also with the chemical companies.

The total extent of the property consists of 11,500 acres of which approximately 900 acres have been closely drilled and shafted and 3,000 acres have been generally prospected.

The proven area contains approximately 62 million cubic yards and the probable area contains 137 million cubic yards or a total of approximately 200 million cubic yards.

Our proposal is to put 2 dredges on the property and to mine about 2,500,000 cubic yards a year. Because of the elevation being 6,300 feet, we won't be able to work the year around, and plan to work 10

months of the year. With that program, the proven ground is 25 years of production, and the partially proven ground makes a total of 80 years, on the entire project, excluding the additional land under lease that has not been prospected.

The CHAIRMAN. At what rate of production?

Mr. PORTER. That would be at 2,500,000 a year.

The CHAIRMAN. Tons?

Mr. PORTER. No, that is cubic yards.

The CHAIRMAN. What percentage? Are you coming to that in your statement?

Mr. PORTER. Yes. That only takes half the amount of the property. That is only about 4,000 acres, and our total was 11,500 acres.

The dredge will dig the gravel and concentrate, the black sands, which will be pumped off the dredge, and then will be sent to a concentrating plant, and then from the concentrating plant the material will then go to the chemical plant.

The CHAIRMAN. You contemplate building a concentrating plant?

Mr. PORTER. Yes. And up to the present time this has all been done on private capital. We have had very wonderful assistance from the United States Bureau of Mines and the AEC in regard to the technical work on it. We have put into it, at the present time, about $350,000, and we hope to carry it out to the end without Government assistance, although we do have an application in, which will amount to an additional $1,500,000.

The CHAIRMAN. That would be about $2,500,000 invested altogether.

Mr. PORTER. Altogether, including presently owned dredges and equipment.

The CHAIRMAN. By the time you are really ready for production.

Mr. PORTER. Yes.

This deposit is alluvial and the minerals are present due to the erosion and concentration of the pegmatite dikes on both the east and west sides of Bear Valley.

Dredges will dig the alluvial material and will concentrate the black sands containing the valuable minerals and these will be pumped off to the shore then trucked to a concentrating plant to be segregated into their component parts.

The concentrates will be as follows: Euxenite and samarskite 800—900,000 pounds per year comprising the following 28 to 30 percent combined columbium and tantalum pentoxide, 9 percent uranium oxide, 20 percent rare earth oxides, 1½ percent thorium oxide, and 21 percent titanium oxide. The other products to be produced are 600 to 700 tons of Monazite per year and approximately 125 tons of ilmenite per day. These materials will then be shipped to a chemical smelter for refinement by processes already determined.

The CHAIRMAN. Ilmenite is a very important product in the production of titanium, as you proably know.

Mr. PORTER. Yes.

The CHAIRMAN. We are now getting a large amount of titanium ore from Australia.

Mr. POTTER. With our production of 125 tons of ilmenite, there will be a daily production in the Boise area of 250 tons of ilmenite a day, and these figures and percentages can be substantiated by a confidential report to the United States Bureau of Mines Bulletin which has just been recently completed.

The CHAIRMAN. Would you make a copy of that available?

Mr. PORTER. We do not have a copy of it.

The CHAIRMAN. We can secure it.

Mr. PORTER. The present schedule for operations is as follows: One dredge is now being erected on the property, one dredge is to be erected the spring of 1954 along with the land plant and should be in full production not later than September in 1954.

The production of uranium may be increased at any time it is desired by the installation of additional dredges; however, a problem arises there. If the production of uranium is increased, the quantity of columbium and tantalum produced would also be increased, and under the present Government purchase program the amount of these two minerals which could be delivered to the Government would be limited to the amount contracted for.

The CHAIRMAN. You might be interested to know that testimony from the engineers of the Bureau of Mines show that over a proper interval, and a proper development program, that the Western Hemisphere could become self-sufficient in columbium and tantalum. I do not remember whether the United States could be made self-sufficient, but with such discoveries as yours, our self-sufficiency might be greater than their testimony stated.

Go ahead.

Mr. PORTER. Now on this material, the chemical work has been completed, the method of concentration of it has been completed, and the method, the new method of recovery by dredges has been all completed. What we are doing right now is putting one dredge on the property. It is being erected right at this time, and we will erect it until the weather gets too cold. We will put another dredge on in the spring. The land plant would be completed by July, and we hope to have the entire plant in production by September 1, that is if everything works out according to schedule.

The CHAIRMAN. 1954?

Mr. PORTER. 1954. This is a new discovery and a new method, and it took quite a few years to develop it. We feel that this new type of mineral plus the research that has been completed opens up a new field in rare metals and similar deposits may be found in the western United States. We feel it opens up a new source for columbium, tantalum, and uranium.

The CHAIRMAN. You think there are other properties in the West?

Mr. PORTER. We know some of them.

The CHAIRMAN. That would be just as prolific in production?

TAX STRUCTURE

Mr. PORTER. I don't know how many. We haven't done any drilling, but we have some properties. In fact, Senator Murray, there are some likely looking properties in Montana, too.

As far as problems are concerned, we have the same problem that everybody else has, and that is taxwise. We have put our own money in here, and the tax structure of Idaho is an 8-percent corporation tax. There is a 3-percent miners' license tax, making a total State tax of 11 percent. Then if you add your Federal of 52 percent, you would have a total tax on your profit of approximately 60 percent,

operating in the State of Idaho. I know that Montana has a miners' license tax.

Senator MURRAY. We have a special one.

Mr. PORTER. I don't know about other States.

All the work that we have done up to the present time regarding prospecting and the research and all, we can't write that off if we want to take depreciation. That is capital investment. We can't take both of them off at the same time. Then we will be taxed approximately 60 percent of all our profits while we are trying to get back the capital employed in getting us started.

If it was put into a 27-percent depletion allowance that would be but a little more than wiping out the State taxes.

The CHAIRMAN. In other words, you feel that the tax structure as it is now has a definite retarding influence on investment in such mining areas?

Mr. PORTER. We have the same situation as the other people. If we increase our production why we are just going to increase our income taxes.

The CHAIRMAN. Get into another bracket without any more net income?

Mr. PORTER. That is right.

The CHAIRMAN. Well, you speak of problems. Hasn't it been the record of mining in this country for many years, that when a problem is definitely isolated, that the scientists in the laboratory work it out if given time?

Mr. PORTER. Yes; that is true.

The CHAIRMAN. Complex problems occur. We had complex lead-zinc ores in southeastern Nevada, and I know that Mr. Snyder of this city worked many years and invested a lot of money. It was supposed that it couldn't be worked, but it has been worked, and the only thing that shut it down was imports from foreign nations. Probably the tax business didn't help it.

Mr. PORTER. No.

The CHAIRMAN. Do you have any other statement?

Mr. PORTER. On the columbium and tantalum we will produce from 250,000 to 300,000 pounds, which will be a large percentage of the present-day use of the material, and we have a lot of it in the ground.

The CHAIRMAN. Senator Murray, do you have any questions?

Senator MURRAY. No. I think the witness is giving us some very valuable information which should be the basis of legislation that will make it possible for us to aid the small producer, and get away from these excessive taxes that handicap, and is a handicap not only to them but to the Nation, as the result of the need for these scarce metals, which we are being deprived of because of the unfair tax methods.

I am grateful for the witness coming here and giving us this very valuable information.

The CHAIRMAN. I think, Senator Murray, when we finish we will have some very constructive recommendations for the Senate of the United States.

Senator MURRAY. I am sure we will. I am very glad to see that the chairman of this committee is devoting his time and energy and his ability to this job, and I am working with him 100 percent.

The CHAIRMAN. Would you give us an idea of what kind of price you realize for the finished material, or the materials you intend to produce, including, of course, the uranium?

Mr. PORTER. On the columbium and tantalum, there is a regular scheduled price.

The CHAIRMAN. Well, we have never produced very much of those metals.

Mr. PORTER. In fact, as far as that is concerned, this mine will be the only large producer of columbium and tantalum located in the United States.

The CHAIRMAN. You don't feel this is the only property that will produce it. If there is proper inducement for private capital to get into the business, you feel this is only a start?

Mr. PORTER. Yes. There may be other lucrative deposits that will be brought into the picture.

In columbium and tantalum there is a fixed price, $1.40 per pound for 35 percent concentrate, and you get a bonus of 2 cents for every 1 percent above that, and then you double that. For example, it is $1.40 or $2.80 for about a 35 percent concentrate, and $5 for a 90 percent concentrate.

The CHAIRMAN. Who worked out your schedule, the General Services Administration?

Mr. PORTER. On the columbium and tantalum?

The CHAIRMAN. Yes.

Mr. PORTER. Yes, I would say so.

The CHAIRMAN. We are very much obliged to you, and if you have any further information that should reach the committee, address it to the chairman of the Senate committee.

### MITCHELL H. KLINE

Mr. Kline, we have questioned you once before. You made a fine witness in Washington, and your testimony was very encouraging to the work of the committee. Do you have any supplemental information on the production of thorium and other metals in this area?

## STATEMENT OF MITCHELL H. KLINE, CHIEF OF THE RARE AND PRECIOUS METALS BOARD, BUREAU OF MINES

Mr. Kline, we have questioned you once before. You made a fine witness in Washington, and your testimony was very encouraging to the work of the committee. Do you have any supplemental information on the production of thorium and other metals in this area?

Mr. KLINE. I would like to make a brief statement, Senator, that would probably clear the matter up slightly. I am Mitchell H. Kline, and I am Chief of the Rare and Precious Metals Branch of the Bureau of Mines, and have been designated as the liaison officer between the Bureau of Mines and the Atomic Energy Commission.

We have, for the past several years, been cooperating with the Atomic Energy Commission in working out many of their field and research problems. Our program has consisted largely of doing special research problems for the Atomic Energy Commission, and special exploration problems including some special mining develop-

ment research work which has been turned over to us. In that capacity, performing these operations for the Atomic Energy Commission, we have explored this particular area in Idaho which Mr. Porter has told you about. We feel that it is an important and significant discovery, and it opens an entirely new field for the mining industry, one in which we are very happy to participate because it will contribute many of the rarest and most critical minerals that we need for self-defense.

This industry is new and will need some assistance. It is not one that can stand on any one mineral coming from the property. It is a case where each one of the minerals being mined will have to contribute its share to a part of the operating cost. Further than that, it fits into the larger picture of the new monazite industry which has recently developed in Idaho, and again we have the problem of whether or not under these circumstances we can operate economically.

The CHAIRMAN. Formerly we were importing a lot of monazite material?

Mr. KLINE. That is true, Senator. Before 1949 or 1948 we used to import practically all of it from India or Brazil. Those countries later placed an embargo on this mineral, and no further shipments were allowed abroad.

The CHAIRMAN. Those countries did establish an embargo, you say?

Mr. KLINE. Yes; both India and Brazil set up embargoes.

The CHAIRMAN. That is very interesting to the chairman of the committee, and I think to Senator Murray and the other members. We have become dependent on many of these foreign nations for minerals and materials, without which we cannot fight a war, and without which we cannot even live in peace. You say they set the precedent of stopping shipments to this Nation of very important material, something we had to have?

Mr. KLINE. That is right.

Senator MURRAY. That indicates more than ever the need of developing these rare minerals in our own country, and I think the testimony here today is showing that there is a possibility that we can make ourselves self-sustaining.

The CHAIRMAN. Yes; and there is, of course, one further point that even friendly nations like Brazil, and India, can stop these shipments at any time. A newspaper report last night said Madame Pandit, who is now president of the United Nations, has asked special permission to be neutral. Brazil has not asked permission to be neutral. Yet neutral nations, not wanting to offend either side in a potential war and nations at war, could very easily put us out of business through an embargo, is that true?

Mr. KLINE. That is true.

The CHAIRMAN. Well, then, when war starts—which we hope will not start, and, of course, the chairman has some idea and has long had it, after going through three of these engagements, that if we are ready and know what we can do, we probably wouldn't have a war—the fact that we are friendly with the nations that control these colonial slavery nations like the Malay States and Indochina, and the nations in Africa, it would avail us very little, because we will not be able to go near the colonial nations. That was shown in World War II in the Far East.

What you are saying is very interesting, Mr. Kline. Proceed.

Mr. KLINE. I might say in line with that statement, I understand we only had about 2 months' stock of monazite ore in this country when the Idaho field came into production. We were indeed fortunate and lucky to have been able to have this industry going, just in the nick of time, you might say, and that falls in this picture of the whole Idaho group of operations. Under present circumstances, we could operate on the income from one mineral product if there were no competition from foreign producers. However, as soon as the situation changes, if it ever should, and we have to go into an open market on a competitive basis, we are going to have to depend on the byproduct materials to stay in business.

We have mentioned, as Mr. Porter also mentioned, the ilmenite that will come out of Bear Valley. An equal amount will come out of Long Valley where monazite ores are now in production. We have faith in our research, and we believe under fortunate circumstances that, in the not too remote future, at Henderson, Nev., we will be able to convert this ilmenite into a product for making titanium metal.

The CHAIRMAN. That is very interesting. This committee has just completed hearings in Henderson, Nev., and they are getting their material from Australia, which could be made unavailable through submarine warfare.

It develops that ilmenite is just as good a material from which to get titanium, and general testimony has shown this mineral is practically unlimited in the United States and Canada. It is merely a matter of grade. So this is right in line with the significance of the question.

Mr. KLINE. We believe we are very fortunate with regard to our research on it.

The CHAIRMAN. Do you agree with Mr. Porter that this is only one property, and there are many other properties, which, with private incentive and private capital investment would be made available over the near future?

Mr. KLINE. We are continuously searching in the field, looking for new properties. The reports for last season's projects soon are going to be due. It is too early to say how much they will show, but we can say the prospects are good.

The CHAIRMAN. The history of any mineral is that when the profit incentive is present, and once the chemical and metallurgical problems are worked out and investors know that a profit can be made, there are further discoveries; is that correct?

Mr. KLINE. I think that has been nearly always true.

The CHAIRMAN. Now speaking of byproducts, precedent has already been set. There are very few mining products in the United States that stand on their own feet altogether. Maybe copper or coal.

Mr. KLINE. That is true.

The CHAIRMAN. Other materials have to help pay the milling costs on minerals which contain only one-half of 1 percent metal. The cost of mining most minerals is helped materially by the recovery of byproducts, isn't that true?

Mr. KLINE. As we go into low-grade materials, Senator, that becomes more and more necessary. I think I stated they are recovering some low-grade uranium from phosphates, and the phosphate production must help to pay the cost.

The CHAIRMAN. How about thorium? You haven't covered that, and it has some importance also?

Mr. KLINE. I feel thorium is a very important element. You only have to look at the periodic table to see its relationship to uranium.

Mr. Johnson testified yesterday that we want all the uranium we can get, and that is their goal. We may still be short of that metal and have to consider some substitute. The most likely one is thorium.

We think there is a great deal of significance in the fact that monazite, samarskite, euxenite, and fergusonite also contain large amounts of thorium along with the uranium, columbium, and tantalum contained in the latter minerals.

The CHAIRMAN. I only have this comment to make, and I made this comment to Mr. Johnson, that at the moment we need all the uranium materials we can get, both foreign and domestic. That would be a rather risky statement to make at the rate that the material is being discovered in this country, it seems to me, if it were made for the future, because much testimony has been presented here that under proper conditions, say a tax setup under which people could continue to produce, producers could increase production and not lose money by getting into another income tax bracket. We are now making contracts with foreign producers and practically writing off all taxes, foreign producers not paying the tax at all, and furnishing them money in addition to the product.

Morocco was furnished $25 million to produce zinc and lead, and the tax situation is very nice in Morocco. There are no such taxes as we pay here, no industrial insurance, social-security insurance, or unemployment insurance to amount to anything.

It seems to some of us, in view of the testimony we have heard, and in view of our national-defense problem and our almost total dependence for some of the materials without which we cannot fight a war on countries across the major oceans, and the need for development of our own economic structure, that we might turn our gaze toward the United States sometime, and toward some of our own producers.

I think your testimony is very important here. Do you have any further statement?

Mr. KLINE. Nothing further.

The CHAIRMAN. I think we asked you this question in Washington, whether under proper conditions of encouragement and investment of capital, we could become self-sufficient in the development of other important materials, or whether we could increase our materials in the United States, and become self-sufficient in the Western Hemisphere under a proper program.

Mr. KLINE. I believe if the conditions were propitious and there was a good market, and there was an assurance to the operator that they could continue to operate and they were not going to be suddenly stopped because of the influx of foreign materials which would compete with them, we could very nearly meet or maybe exceed our own national requirements.

The CHAIRMAN. Right here in the United States?

Mr. KLINE. With respect to these minerals, I think that is true.

The CHAIRMAN. Thank you very much. Senator Murray, do you have any questions?

Senator MURRAY. No. I was very much interested in the statement that many of these large operators, producing copper, for instance, have side issues of minerals that are of market value that can be saved, especially if they are lower grade, as well as in their operations. There are many of these scarce materials involved in it, and it seems to me a very careful study of these problems should be made in an effort to find sources of supply of various metals that are necessary for our defense.

Mr. KLINE. We think it is highly important. We might say that especially with regard to the rare metals which are becoming more critical and more essential to our industry every day. We think we should keep pace. It is axiomatic almost, and we can point out in the examples of titanium and zirconium, two metals which have recently come into industry, that this is the case. When we have started to produce new metals, we couldn't sell them because people didn't know how to use them. As soon as we had sufficient quantities of these metals available for the market, there was a greater demand than we could satisfy, and that is true of these two wonder metals that have just come on the market.

Senator MURRAY. I think the witness is entitled to our thanks for appearing here and giving us this valuable information.

The CHAIRMAN. I would like to say to you, as I think I said it yesterday, in my investigation of steel and coal mines in England, Sir Ben Smith told me if they wanted to they could shut down exports from three-fourths of the areas of world supply of materials, indicating a sort of threat that unles they were properly compensated and properly treated that they might do just that.

Now this statement that you have made here today is simply an example, that Brazil——

Mr. KLINE. Senator, if I were British, I would hesitate in this day and age to make that statement.

The CHAIRMAN. So would I, and I think we should refuse to be threatened. But when you do not have your own materials and we are fully dependent on getting 800,000 or 900,000 pounds of manganese annually from India, what can you do?

But the point the committee is trying to establish, is whether it is true that this dependence is not necessary. I think you have contributed very greatly to the evidence and to the progress of the committee here today, and I thank you very kindly. When we are in Washington, we will probably hear you again before we are finished.

The Colorado Mining Association is represented here today. Of course, we heard Mr. Robert Palmer yesterday, and he is in touch with the committee and can offer further information, but we have Mr. Seymour, Mr. Cooper, Mr. Worster, and Mr. Newell. If those four men would come forward and take their turn, or testify in any way they see fit, the committee will appreciate it. We would like to have you all come to the table here, because I know you are prepared to offer your testimony.

Mr. Palmer, would you like to sit up here too? Mr. Palmer is secretary of the association.

Now give any information you have, and take your turn. In offering your testimony, identify yourself.

## STATEMENT OF FRANK SEYMOUR

Mr. SEYMOUR. Chairman Malone and Senator Murray, my name is Frank Seymour. I have a prepared statement.

Prior to that statement, it seems that the testimony of this entire hearing is centered on the uranium we can get. I wish that I were qualified from a personal standpoint to testify as to the tax problem that some of the other gentlemen have testified to. That problem is probably the most important problem to a producing property. However, I have tried to draft this material to show the problem of the person or the companies that are interested in finding uranium, and in our opinion title to land is one of the most important problems in that phase of the business. If I may, I will read this testimony.

The CHAIRMAN. Proceed.

Mr. SEYMOUR. I am a practicing attorney in Grand Junction, Colo., and have been actively associated with many mining companies that are producing uranium. Like most attorneys in Grand Junction, Colo., I have been instrumental in forming and representing new companies that are entering the uranium mining industry. I am a partner in three mining companies which are now producing and shipping ore to the mills or buying stations. One of these mines is near Edgemont, S. Dak., and the other two are close to Gateway, Colo. One of these partnerships, called Amco Mining Co., has an exploration team in the field using an aircraft with the latest scintillation equipment. This team was successful in locating some of the recently discovered anomalies, or deposits, in the Riverton area of Wyoming. Beyond my personal interest in the uranium industry, like other attorneys in the Colorado Plateau area, I represent a portion of the other mining companies in the business.

It is my understanding that this hearing is being held with the intention of gathering testimony which may be helpful in recommending policies that could help increase the production of vitally needed uranium.

The CHAIRMAN. Yes, to make it plain, this is the committee that heard the testimony and recommended that legislation passed at this just recessed session of Congress, the first session of the 83d Congress, to coordinate the operation of the oil and gas leases under the 1920 Oil and Gas Leasing Act, and the 1872 Mining Act, and we want to hear any testimony as to how it has worked out, and if anything further is necessary. Then under Senate Resolution 143, the committee is charged with determining the availability of the critical materials to this Nation in time of war, and certainly this is one of the critical materials.

### MULTIPLE USE LANDS

Mr. SEYMOUR. There are many persons more qualified than I to recommend improvements in the access-road problem, the tax structure in regard to depletion and income, the high lime penalty, the withdrawal procedure, the Defense Minerals Exploration loans and the granting of Government leases on property previously explored by the Government drilling programs. The Colorado Plateau uranium committee of the Colorado Mining Association felt that it might be well, if those of us representing that organization at this hearing, limit

ourselves to the discussion of one major problem or recommendation each. Because of my particular training I would like to bring to the attention of this subcommittee the still remaining problem of the much needed multiple use of Government lands.

Briefly, this is how the problem arose. Section 5B7 of the Atomic Energy Act, passed by the 79th Congress, declared that all uranium, thorium and other materials peculiarly essential to the production of fissionable material was thereby reserved for the use of the United States. This particular section has never been clarified as to its meaning and the legislative history surrounding the passage of the act is not too clear or helpful. During the summer of 1952 it came to the attention of the Atomic Energy Commission, from several sources, that a good many of the claims staked on the Colorado Plateau for uranium were on property which had previously been impressed with an oil and gas lease from the Government to private industry. The Defense Minerals Exploration Administration, being aware of the 1924 land decision invalidating all mining claims on land impressed with an oil and gas lease, began denying financial help to the companies whose property was then in doubt as far as title was concerned. The Atomic Energy Commission was also concerned with these claims which were apparently invalid. Such a claim was not eligible for the bonus payments from the Commission. In order to forestall any decrease in production from these properties the Atomic Energy Commission wisely began leasing these properties to the persons that had staked the claims over the oil and gas lease property. The lessees were then able to apply and receive the bonus and any information available from Government drilling was released to the claim holder. This stopgap measure was successful and production was not seriously impaired.

It is estimated that two-thirds of the Colorado Plateau is now impressed with applications or actual oil and gas leases. As you all know, Public Law 250, S. 1397, prescribed a method whereby a person that had located uranium claims on oil and gas property could validate those claims provided he had staked the claims between July 31, 1939, and January 1, 1953. In order to validate these claims the locator must, prior to December 10, 1953, post an amended location on the property and file an amended location notice with the proper county. Apparently, if the locator does not take this action, his claim, after December 10, 1953, will be void.

Since January 1, 1953, many claims have been staked on the Colorado Plateau on property which has been previously covered by an oil and gas lease. The area known as the Big Indian Wash, near Mr. Charles Steen's mine, has had many claims staked since the first of this year. I think it is safe to say that a very large majority of these claims are in the following predicament. There is no present law or regulation which will permit these claims to be validated for the bonus payment from the Atomic Energy Commission or to be recognized by the Defense Minerals Exploration Administration for purposes of loans for exploration. Furthermore, if the Government locates ore on these properties with their drilling programs there is no provision whereby this information can be released to the locator of the claims, nor is there, as yet, any policy for leasing this property in order to get into production. I recently was forced to advise a large company in the industry that they would not be safe in purchasing a block of

these claims because they would have no assurance whatever of obtaining title or the exclusive right to mine this property. Furthermore, the company would have no assurance of being eligible for the bonous or for an exploration loan from the Defense Minerals Exploration Administration.

NEEDS IMMEDIATE ATTENTION

I believe that the foregoing adequately illustrates the problem that this uncertainty of title to uranium property presents to the industry as a whole. It is at this time restraining the development and mining of a large number of claims and, in some cases, entire areas. There are those that would advocate a Government leasing program on these uranium claims similar to the oil and gas plan. Others, and among these we find many of the uranium mining people, would advocate further legislation to validate all uranium claims that have been properly located on public lands. Being closely associated with the mining industry I believe that this plan would meet with the most favor among uranium mining people. One supporting reason is the fact that a good share of the entire Colorado Plateau has been located at a considerable expense to the persons in the industry. To invalidate all of that work and to ignore the expense involved would be criticized by many of the companies and individuals in the business.

It is the thought by the Colorado Plateau uranium committee of the Colorado Mining Association that this problem requires immediate attention. If greater production is to be achieved in the near future it is our recommendation that this problem be solved in some manner at the earliest possible date.

We want to thank this committee for the opportunity of appearing here and if there is anything further that the Colorado plateau uranium committee of the Colorado Mining Association can do to be of service to you, or to the industry, we will be pleased to do so.

The CHAIRMAN. Senator Murray, do you have any questions?

Senator MURRAY. No. I think in view of the fact that the witness is a lawyer and would be able to be of considerable help to us in determining what amendments should be made and the laws that should be drafted to meet these conditions, that he might be able to submit a statement to us in which he makes the particular recommendations for legislation or amendments to laws.

The CHAIRMAN. I think that is a very good suggestion. Would you be willing to do that?

Mr. SEYMOUR. I would be very happy to.

(These recommendations were not received at the time the hearings were printed. If furnished they will be made a part of the committee files.)

The CHAIRMAN. Just send it to the chairman of the committee.

Do you have anything else?

Mr. SEYMOUR. That is all.

The CHAIRMAN. Thank you very much. I think your suggestion is simply as to the dates of validation?

Mr. SEYMOUR. That is right. I had the privilege of appearing before your committee in Washington, and also the House committee,

and we appreciate all the committee has done to help the industry and the people in the business.

The CHAIRMAN. One of the problems the committee meets is that great harm could be done if we modified the 1872 Mining Act, by extending it to other locators and other areas where the same conditions would prevail.

Some of us are very jealous of the 1872 Mining Act, because it is about the only thing left where a man, without funds, and simply a few beans and bacon, can go out and make a discovery. If we are to impair that right—some people are very insistent they would like a leasing system and not a location system. Some of us are hard to convince in that regard, but we do realize you have a problem.

## STATEMENT OF HAROLD S. WORCESTER, VICE PRESIDENT, COLORADO MINING ASSOCIATION

Mr. WORCESTER. I am Harold S. Worcester. I am vice president of the Colorado Mining Association, I am vice chairman of the Colorado metal mines and fund board, I am chairman of the San Juan section of the American Institute of Mining and Metalurgical Engineers. I am manager and partner of Worcester mines. I am consultant for Cal Uranium Co., and consultant for other producers. I am a member of the Colorado Plateau uranium committee of the Colorado Mining Association.

Speaking as an officer of the Colorado Mining Association, we want to put in the record that we heartily endorse the statements of Mr. Robert Palmer, our executive director, made earlier in this hearing.

### ROADS AND TAXES

The policy of our own organization, which is very old, as you know, is to maintain a friendly dignified cooperation with agencies and our numerous friends in the congressional bureaus. We have found that we can sit down and talk things over with our AEC organization in Grand Junction, and that they are ready and willing to listen, and to do all they can for us in that affice. I think that this is very definitely a thing of the past year or two, particularly since Mr. Wimpfen came to Grand Junction.

We are going to do certain things. We are definitely asking for much more work on access roads, which would help production of uranium. Many small miners could open up their places and get production if they can have even a half-way road to their job. This is proceeding now, but it needs to proceed a great deal faster than we are doing it.

I can tell you I operate one mine, and a week ago for 3 days we could not get to the mine because of mud, so it gives you an idea of what the picture is. I am personally interested in the matter.

The CHAIRMAN. Well, I think that most of the subcommittee members are familiar with what happens in storm areas in the mountains and deserts.

Mr. WORCESTER. Well, it is particularly so in our formations in which uranium occurs. Commonly we have certain mud bottoms and mud stone bottoms, which are peculiarly tough, and we need roads.

We wish consideration of any means of reducing taxes, particularly for the small miner. This may be by definite reduction of taxes, by increase of depletion allowance for uranium and allowing recovery of all original capital costs of a given operation before any taxes. Any one of those may serve the primary thing, but I think I can speak with authority that a man will produce a great deal more, proportionately at least to the reduction of his taxes. He will produce more uranium if he gets a reduction in taxes.

I can say from a personal knowledge of 6 or 7 producers, that they are already on curtailed production for this year, because they have reached a tax bracket that they don't care to go beyond.

The CHAIRMAN. It appears to some members of the committee that we ought to at least treat our own people as well as we do foreign producers. We are making special foreign concessions, not only advancing money and simply recovering the money, if we recover it at all, out of production, and where taxes are practically nil in many cases, and also as far as the working man is concerned, in some cases they pay very little more in wages than we pay in social security, unemployment insurance, and industrial insurance. I think the whole thing needs an airing, and I am glad you men are bringing it up.

Mr. WORCESTER. I go further. Taxation is against the principle of our Atomic Energy Commission setup, since it reduces the public production of ore. Your whole price—in other words, at this price you have a limited return, at which point your taxes are taking the profit, and nobody cares to go further.

The CHAIRMAN. You do believe that the production of uranium material would be materially increased if you could establish proper incentive?

Mr. WORCESTER. I know this from certain of my clients whom I have consulted.

The CHAIRMAN. Do you agree with other witnesses that in a reasonable time we might become self-sufficient in the production of uranium materials if a proper incentive were established?

Mr. WORCESTER. I will speak on that portion of it when I talk of Cal Uranium.

The other thing, our committee feels that in the selection of operators for AEC leases no operator should sit on the board of selection. In other words, it isn't fair to have the information connected with these leases go out to everybody and go out on the leases, the number of leases which will eventually be available and which may become available. It wouldn't be fair to have somebody sit on that board and then be able to go out and pass the information along to somebody of his own choice, to look after a certain lease.

In other words, these leases are going to appear. We feel that the present method is more nearly fair than any that anybody has put up to date.

Now, I want to interject at this point something for other metals, because I represent the Colorado Mining Association. This matter of treating our metals as though they should be placed in a refrigerator from now until doomsday, and then giving every foreign country a friendly climate for the production of these metals, is to my mind almost criminal.

The CHAIRMAN. You think it discourages producers in this country?

Mr. WORCESTER. Discourages them? It is worse than that. I would say this, I think that all of you know that I have been producing lead, zinc, copper, gold, and silver, for all of my days. I have been in this field, and I have had to leave it and go into the uranium game.

Of course, this is fine for the uranium miners and uranium Atomic Energy Commission, but I do say that when you have lots of mining going, then there are lots of miners, and you can raise miners from your families, and so forth, and go on, but there is no incentive to raising another miner today.

The CHAIRMAN. Young people are not going into the prospecting, exploring business?

Mr. WORCESTER. There is no incentive.

The CHAIRMAN. It is just you old timers that are stuck. You don't know anything else. It is a disease anyway, isn't it?

Mr. WORCESTER. It seems to have a glamour to it anyway. In any case, I just show you our own Colorado School of Mines is getting very few applicants for training in mining. They are all out for petroleum, geology, something like that. They don't care for training in mining.

The CHAIRMAN. They want to be lawyers and doctors and accountants, they don't want to go into a business that is folding up?

Mr. WORCESTER. That is just the effect of it, and when we need those miners, we will have men who don't know the technique of production. They just come into it suddenly.

The CHAIRMAN. I think that is one of the finest statements you have made. If you have a fair mining industry and prospects for a mining industry and for new development, you will attract miners.

Mr. WORCESTER. That is right.

The CHAIRMAN. Go ahead.

Mr. WORCESTER. I speak further now in connection with taxes. This business of taxes on uranium. Uranium is something that the Government is paying for and has to have. The system is totally criminal. We are robbing Peter to pay Paul.

The CHAIRMAN. Do you think you ought to be treated as well as anyone in Asia or Europe or Africa?

Mr. WORCESTER. It is perfectly terrible, as I see it, to say that they should be treated any differently.

The CHAIRMAN. Let me ask you about this subject of trained men. Naturally there are various groups in the country. Take the watchmakers, the precision-instrument makers and the textile people, and the hundreds of other industries, which are just sort of watching their own industry, which is natural. About all a man can do is to watch his own business if he does a good job of it. But there was a spectacular meeting in New England the other day, a meeting of the textile manufacturers to pass a strong resolution to the Tariff Commission and the President and the State Department, who really have the matter of the decision of life and death over any industry, to allow their tariffs to be adjusted to make up that differential between wages and standards of living here and abroad, and other factors. They also passed another resolution, which is very interesting to me, as long as their chief ingredient is wool. They passed a resolution against any tariff on wool. Of course, no one would go into the sheep business in his right mind now with free trade on wool.

So I think it is necessary for the mining industry to join with other industries, representatives of other industries throughout the Nation, and discuss common problems. If you do not do that, you are simply speaking and talking for your own business.

Some people think Malone is naturally interested in mines, because that is the chief industry of Nevada. Well, I think we are bigger than that, and we are giving every industry in the United States an opportunity to talk, and they are talking. But as long as we remain divided, then it gives the State Department, which hasn't changed its policy very much, I am sorry, to say an opportunity to work one crowd against the other, and the first thing you know the transfer of authority from Congress to the Executive is extended. You are all in the same boat and perhaps do not even know what happened to you.

I think if we would just let our gaze wander a little and talk in broader terms, we would be probably better off. Go right ahead.

Mr. WORCESTER. Now I am speaking as consultant for Cal Uranium, and I thought it was well to give you the workings of going through the position of a prospector with a little more money than the ordinary man.

Cal Uranium has an operation occurring in the Big Indian Valley country of Utah, which is in San Juan County. This is a group of claims which were taken up several years ago, and on which an attempt was made to make a production from a bedding below Chinle D. Chinle D is the ore horizon in which Mr. Steen's ore occurred.

Shortly after he made his discovery, the corporation decided to do some work on their ground. They placed it in good order and then started to drill holes.

It was evident that they weren't going to have funds sufficient to do the whole job. The Commission, that is the AEC, had started a program of drilling in the Yellow Circle group, in which Mr. Thornberg is probably the biggest operator. They moved from this to Cal Uranium ground and drilled holes on a general 500 to 1,000 feet pattern through the area. At one point they found what they thought was something of considerable importance, and drilled more holes.

We then, being cooperative with Mr. Steen and Mr. Hudson and the LaSal Mining Co., proceeded to split the holes with them to get the drilling done in our area.

From this we developed what is definitely a minable ore body of considerable extent. We are sinking a shaft to this ore body. We still have to drill a great area further on our claims, due to indications that ore may occur. In other words, the final ore body is very probably of great size. I can't give you the exact details, because we keep that in the company; but I am giving you this to show you the cooperation of the AEC with us. Our work showed up an ore body, and at this time they have proceeded on, drilling the ground south of us, I believe owned by Mr. Jack Jones, and then they proceeded further to the south and are drilling ground owned by Mr. Balsley.

Now, I think this was an interesting program, because in each case they brought in new ore bodies. I don't think there is any question. I am not sure of the school section, but I do know the ground to the north of us is developing. As a result of that program and drilling by them we have definitely found a very large ore body. I think Mr. Wimpfen will agree with that, throughout Mr. Steen's ground and our ground and the LaSal Mining Co.

Mr. WIMPFEN. That is right.

The CHAIRMAN. The point you are making, Mr. Worcester, is that if there is a financial incentive to develop reserves and continue mining, and many forget that the profit system and the profit promise is about all the incentive that is interesting to people trying to make a living—that in your judgment there will be continual ore reserves developed?

Mr. WORCESTER. That is right, providing the incentive is given. And I think the drilling program of the AEC has been most successful in providing that incentive, because it is certain that Cal Uranium could not have drilled the area that was drilled alone.

The CHAIRMAN. But you still have your tax structure that puts you into a higher bracket when you increase production substantially?

Mr. WORCESTER. That is right.

The CHAIRMAN. At certain points.

Mr. WORCESTER. At certain points.

The CHAIRMAN. Do you have any further statement?

Mr. WORCESTER. I have no further statement.

The CHAIRMAN. Senator Murray?

Senator MURRAY. I have no further questions. It seems to me that the conclusions that this committee must arrive at are obvious. There must be something done to help these small producers. The predicament they find themselves in in regard to taxes and in regard to the transportation problem, access roads, I think it has been shown very clearly that something must be done if we are going to encourage and bring about the continued development of these necessary minerals for our country.

Mr. WORCESTER. Thank you.

The CHAIRMAN. In other words, the preponderance of the evidence for all of these strategic materials seems to point out that our own producers should get at least equal treatment to foreign producers.

Senator MURRAY. That is right. I come from a mining State, and in my earlier days I took an interest in mining and went into the development of mining properties myself, but I wasn't successful. I went into the development of a small gold property near Virginia City, Mont. It was quite a distance from Butte, where I lived. We had to send some men out there to operate the property and they highgraded some of the ore and shipped it in a fictitious name, and we had to pay the costs of mining and operation. I quit mining and went to practicing law. Those are days when we didn't have a tax problem.

The CHAIRMAN. We have one more witness.

Mr. PALMER. Yesterday you inquired about the different types of ore bodies in which uranium is found. Mr. Cooper here is from the White Canyon area of Utah, in which uranium is found in the—well, I would say in combination with copper. He is one of the operators of the famous Happy Jack property in southern Utah.

The CHAIRMAN. In other words, it is another case of by-products. Will you identify yourself for the record, Mr. Cooper?

## STATEMENT OF J. W. COOPER, BRONSON-COOPER MINING CO.

Mr. COOPER. Mr. Chairman and Senator Murray, my name is J. W. Cooper, and I am associated with the Bronson-Cooper Mining Co.,

which is a partnership, located in Monticello, Utah. I believe everything in our line, as far as our problems concerning taxes and things have been covered. We believe as far as taxes and things are concerned, whatever can be done should be done to make it easier for us, you might say, in mining.

I might give a brief history of this operation, and that is about all I could do for this area.

We started there in 1946 to produce copper. We happened to be the first ones in that area. We shipped our copper to Salt Lake, knowing at the time it had uranium in it, but there was no market for uranium. And then in 1947 and 1948 we tried to get the Atomic Energy Commission interested in this type of ore, but it was new, so there was nothing we could do about it. There was no market, and we couldn't sell it, and yet it had uranium in it.

So we proceeded to negotiate with the Vanadium Corp. of America for a mill in that area. We agreed to furnish the ore if they would put in the mill and process the ore. This seemed like the only way for us to get a market for the ore at that time.

I am bringing this up to illustrate the place that large capital, working with a small miner, might work things out.

After we operated there for about 6 months, of course, winter set in, and the mill was closed down. In the spring of 1950 we commenced operating again, shipping ore, but due to the low recovery they were getting at that time, it looked doubtful whether the mill would continue to run, and this was when the Atomic Energy Commission started to move into the picture in that area. Through their assistance, and along with the assistance of the Vanadium Corp., it looked like we could start operating again, and Mr. Jesse Johnson made a trip into that area in the fall of 1950, and things started to proceed and make it look like it would be a producing area. After he visited the area, I believe that he could see the possibilities that it might have, taking ore reserves in that area.

Since that time we have been in the prospecting stage, you might say, or development stage. Since we started in 1950 up to the present date we have driven about 7,000 feet of tunnel. We have been developing ore all this time, and for every ton of ore we take out we develop 10 tons.

This operation is a little bit unique, because it is probably the only one on the whole Colorado Plateau where one mine has supported a mill by itself. However, it is quite a small mill, and plans are being negotiated for a larger mill.

The CHAIRMAN. What is the tonnage it handles?

Mr. COOPER. The tonnage of the mill now is approximately 30 tons a day in all. It is a pilot plant. What the tonnage of the future mill will be will probably be left up to the Atomic Energy Commission.

In the process of this mining we have developed probably 400,000 or 500,000 tons, blocked it out.

The CHAIRMAN. What does the ore you block out run?

Mr. COOPER. Well, it is comparable to the other ore in the area, approximately 0.40.

The CHAIRMAN. What other mineral?

Mr. COOPER. The only other mineral is copper, which they don't recover now.

The CHAIRMAN. To what extent?
Mr. COOPER. About 1 percent.
The CHAIRMAN. It could be recovered?
Mr. COOPER. It could be recovered.
The CHAIRMAN. And would be in the contemplated new mill?
Mr. COOPER. In the contemplated mill.
The CHAIRMAN. Do you have any further statement?
Mr. COOPER. No, I believe that is all I have.
The CHAIRMAN. Senator Murray?
Senator MURRAY. No questions.
The CHAIRMAN. We thank you very much for your statement.
Mr. Palmer, would you like to sum these statements up for the benefit of the committee, or do you think it is all in the record?
Mr. PALMER. Mr. Chairman, I think we have imposed upon your time enough, and I know that you are working under a close schedule, so we will thank you for the permission for these men to appear before your committee, and express to you our sincere hope that you are successful in your efforts to accomplish results for the uranium mining industry.
The CHAIRMAN. I will say to you, Mr. Palmer, you are well known to all the members of the committee, and if you care to and have further information of interest to the committee, simply mail a brief at any time to the chairman of the committee, Senate Office Building. We hope you will hold yourself available, because the work of the committee will not be finished until after the first of the year, and we might require further testimony from you.
Mr. PALMER. Thank you.
The CHAIRMAN. Thank you very kindly.
Mr. Hall, the committee is generally familiar with your work, but not in detail. We have heard very little testimony in regard to the operation, and the efficiency of the mills and the difficulties that the milling operators encounter. If you will just identify yourself for the record and give us in your own way any information you think would be helpful to the committee, we would be very appreciative.

## STATEMENT OF WILLIAM HALL, VICE PRESIDENT AND PLANT MANAGER, VITRO CHEMICAL CO.

Mr. HALL. My name is William Hall. I am the vice president and plant manager of the Vitro Chemical Co. Vitro Chemical Co. owns and operates a mill which processes uranium in Salt Lake City.
I have no formal statement to offer, Senators. I would be glad to answer any questions.
The CHAIRMAN. I think it would be better if you gave us an idea of your operation. This is new, not only to the prospectors and miners, but to the committee generally. You have heard the testimony for the day and a half we have been in session, and I am sure that you could give us a general picture of the milling operations that would be helpful to the members of the committee present, and especially to those who are not present.
Mr. HALL. Our mill in Salt Lake is a nonvanadium mill. We buy all the ore that we can buy which we can treat economically. This automatically limits us on carnotite ores, for which we would pay for the vanadium the 31 cents a pound and get nothing back.

Our problems are a little different than those of the other four private companies now operating mills.

The CHAIRMAN. Who are the other four private companies?

Mr. HALL. United States Vandium Co., which is a subsidiary of Union Carbide, Vanadium Corp. of America, Climax Uranium, a subsidiary of Climax Molybdenum, and Anaconda.

We buy all the production from Temple Mountain, Utah, all the production from Marysvale, Utah, all the production from Mr. Pick's mine, all the current production from Montana, and some miscellaneous ores from the east slope of Colorado and other areas.

We operate under a contract with the Atomic Energy Commission to sell concentrates. These contracts are negotiated, as Mr. Johnson described, over a given period of years, the Commission estimating, to the best of their ability, the costs that will be involved, the contractor doing the same, a fair and reasonable profit to be placed on top of this, and then a fixed price developed from there. This varies with different types of ores.

There is a problem involved in that price in that the profit must be sufficient to lure venture capital. It will require probably in the neighborhood of $5 million to build and start a uranium mill similar to ours. It should be available in cash, and to get this type of money it is necessary to have a good incentive.

Mr. Johnson said that the production, which has quadrupled in the last several years, will double, I believe in 2 years, and this means that the milling capacity must also double in 2 years. I think that will be probably as difficult a problem as increasing the ore supply, if not more so, because of this profit incentive.

The CHAIRMAN. Would you explain for the committee in a little more detail why the venture capital might have to be a little more venturesome than is usually found under present conditions?

Mr. HALL. The way this price is developed is in most cases the best estimate from technical laboratory work, from pilot-plant work, and there is not too much actual experience on certain types of ores. As a result this must be squared up, and the prospective contractor is taking a bit of a gamble in that he may lose very substantial sums, because of making a bad estimate, and there is little recourse from that. Our own company has lost over a million dollars in getting this mill started.

The CHAIRMAN. Is there any recourse in the line of negotiation in case you might have made a very fine contract and are making more than a reasonable profit, or it develops into a bad contract because of complex ores and you are losing money on the operation? Is there any such recourse in the contract?

Mr. HALL. There is no such recourse in the contract. However, I would like to point out that the Commission has helped us specifically by, under the War Powers Act—I have forgotten the exact date—reopening our contract after it was originally signed.

The CHAIRMAN. Then there is——

Mr. HALL. This is not common procedure, however. We were starting on a brandnew ore. No one had treated it. We were both in a hurry to get it going, did not take the time to pilot it. We made some bad assumptions in the beginning.

The CHAIRMAN. Then while you are subject to the decision of the Commission, they can, if they so desire under this act that you cite, reopen the contract at any time?

Mr. HALE. I don't know whether that is still in existence. It was in 1952, in March, when it was invoked.

The CHAIRMAN. Well, assuming it is in existence or should be extended, then you are subject to the judgment of the Commission, and if they so decide they can renegotiate it, either if you are making too much money or too little under that act.

Mr. HALL. Under the renegotiation act I believe they could reopen it of we are making too much. I think our contracts are subject to that.

The CHAIRMAN. The Renegotiation Act is not applicable, you said there is no such clause?

Mr. HALL. There is no such clause; no.

The CHAIRMAN. So you are subject to the judgment of the Commission in either case, whether you are losing money or making too much?

Mr. HALL. Yes.

The CHAIRMAN. If you are making too much, they would have to have your consent to reopen it, if there is no renegotiation clause included.

Mr. HALL. This has not been a problem with us, and I am not sure whether that would be required or not. The general renegotiation act, I believe, is applicable to our contract if we make too much money. We are subject to having it looked at by the GAO.

The CHAIRMAN. But they do not make up a deficit?

Mr. HALL. Oh, no.

The CHAIRMAN. They don't renegotiate upward?

Mr. HALL. No, sir; except in this one instance when they did reopen.

### RENEGOTIATION CLAUSE

The CHAIRMAN. Your testimony is valuable, since you have had actual experience with the Commission, and since it is still putting the heat on to increase production. Would you care to make any specific suggestion as to how these contracts should be let for the benefit of the committee? You understand that the committee is trying to be helpful. First, we would like to find out how our act, passed in the 1st session of the 83d Congress, is working out, and it seems to be very good as far as we are able to determine. Then under Resolution 143 we want to find out the availability of this material, as it is one of the 77 materials now listed as critical.

Mr. HALL. We feel that a contract with a price redetermination clause would be more satisfactory for both the Government and the contractor.

The CHAIRMAN. A renegotiation clause, just as it has operated in the past in other connections?

Mr. HALL. That is correct.

The CHAIRMAN. Is there any other phase of the milling operation you would care to discuss with the committee?

Mr. HALL. I have nothing in particular, sir.

The CHAIRMAN. Any questions, Senator Murray?

Senator MURRAY. Is this mill known as a custom mill?

Mr. HALL. Yes, it is. We own no mines.

Senator MURRAY. You own no mines. You buy the ore from shippers in all sections of this area?

Mr. HALL. That is correct.

Senator MURRAY. And who fixes the price for the ore?

Mr. HALL. Our contract to sell concentrates to the Commission states that we will buy ore at no less favorable prices than Circular 5 and others applicable. Circular 5 is this statement which is now of record. I believe that Mr. Johnson put it in the record. Thus the price is fixed, the minimum price is fixed by the Federal Government. We can buy it at as high a price as we would like to pay.

The CHAIRMAN. But you pay the same price to the producer that the Commission would pay to you?

Mr. HALL. No; we pay the same price for the ore that the Commission pays at their buying stations or at their mills. We negotiate the price at which we sell our concentrate which is supposed to allow for the costs of concentrating and for a fair and reasonable profit.

Senator MURRAY. I see. Who determines the costs of the operation, the treatment of the ore?

Mr. HALL. This is determined by laboratory data. You are talking about a new mill starting out?

Senator MURRAY. Yes.

Mr. HALL. Laboratory, and if possible pilot-plant operations. The Commission reviews these data. Much of it is done at the Commission's expense, much at the contractor's expense. They come up with what they feel will be the operating costs of a mill. They meet in conference. If they reach an agreement they have a contract, and if they don't reach an agreement they don't have a contract.

Senator MURRAY. Well, the only source of your profit in operating your mill is the profit that you make from the sale of the concentrates to the Commission?

Mr. HALL. That is correct.

Senator MURRAY. Have you had any complaints from shippers, the producers, with reference to the amount that they receive for their ore?

Mr. HALL. We have had practically none. We are fortunate in having our ore sampled at the Utah Ore Sampling Co., which is recognized by both the producers and ourselves as being a fair and impartial body. Therefore we feel the sampling is good and the weight is good on the moisture in the car. The pulps from the samples are shipped to us and some are retained for umpire.

We assay and buy ore on assay, unless the producer feels this is not a good assay. He can assay every one himself if he wants to. He will then send it to umpire, request that a pulp go to umpire. We have never lost an umpire assay in the 2 years we have been buying ore at the mill.

The CHAIRMAN. That is an old established system that has been in operation for many, many years?

Mr. HALL. Yes, sir.

Senator MURRAY. Sometimes they call it sampling works. What is the sampling where the ore is shipped to, the sampling concern? They put it through a sampler, and it determines the value, determines the amount of mineral, and they determine it from the sampling works.

Mr. HALL. That is essentially what we are doing, and actually the cars are shipped to us via Utah Ore Sampling Co., or they say on the cars, "Stop in transit for sampling."

Senator MURRAY. It is the same thing. I had some telephone calls from some producers up in Montana yesterday. They complained about the price they were receiving, which they felt would deter them from continuing their operations because they weren't receiving enough for their ores to justify them to continue in operation, and I was wondering if there was any way they could be aided and helped to continue their development of these properties that they have in Montana?

HIGH TRANSPORTATION COSTS

Mr. HALL. They receive the same price for that ore that any producer that is here in Utah or Colorado, as far as I know.

Now, this involves a contract which the Commission wrote with the producers and with us in order to help the producers because the freight here from Montana is so large it would eat up the profit. Consequently, we actually bought this ore, which Mr. Eislin shipped, and this was the first car; we bought that car from the American Smelting & Refining Co. who, were acting as agents for the Commission, and bought it from Mr. Eislin, and it was sampled in the normal manner, and the pulps were submitted to Mr. Eislin and the Commission and we kept one.

Senator MURRAY. That is Mr. Eislin, of Boulder?

Mr. HALL. This was the first car he ever shipped. He expected the ore to run higher grade than it actually did. It is difficult to tell with a Geiger counter what that ore is going to run. He is probably disappointed about the ore.

Senator MURRAY. Some of them are going out of the ore-producing business and going into the field of medical use of uranium, and establishing their plants in a situation where they receive patients who come there to get the benefit of radiation from the ore.

Mr. HALL. I am familiar with that.

Senator MURRAY. They are making more money that way than they would selling the ore. I am wondering if these people were contemplating going out of the ore-producing business and going into this other field. I am anxious to see uranium ore developed in Montana and believe it can be.

Mr. HALL. I think that the move that the Commission made to make these contracts with the primitive areas, which has only come about here in the last few months, is an excellent move in that direction. They have now the same opportunity that a miner has 3 miles from Uravan or right next to the plant.

Senator MURRAY. When a shipment is made from such a great distance as Montana, where a lot of the profit is eaten up in transportation?

Mr. HALL. Yes, sir.

Senator MURRAY. That is all.

The CHAIRMAN. You have spoken, Mr. Hall, about not being interested in the vanadium or other materials in the ore. Would you tell us a little more about that as to why, and if these materials could be recovered at a profit?

Mr. HALL. Well, our mill was started here in Salt Lake City based on the availability of ore from Marysvale, Utah, and from Greenriver, Utah. These are about about 180 miles away, both on the railroad. The Marysvale ore body was discovered in 1949, and was the first sizable shipment of ore—sizable body—which did not contain any vanadium. So we organized our mill as a nonvanadium mill, and we still have to pay for the vanadium if we buy it in ore, but we have no recovery process for vanadium. The overall vanadium content that we put through our mill is about one-half of 1 percent—0.5 percent—and this is considered uneconomical by both the Commission and the operating companies.

The CHAIRMAN. But you do pay for the vanadium?

Mr. HALL. We pay for it, but we do not get anything out of it. Consequently, we are not interested in buying ores with high vanadium.

The CHAIRMAN. You pay for it; this is taken care of through your contract?

Mr. HALL. This is taken care of through the contract prices.

The CHAIRMAN. Do you have any further information that would be helpful to the committee?

Senator MURRAY. I would like to ask if the production in Montana becomes greater than it is at the present time, would it be possible for a mill to be established up there, because if they ship the concentrates instead of low-grade ore the transportation charges would not be so high?

Mr. HALL. If it were greater, I think they should have a mill there; yes. How great it has to be for a mill is a matter of economics. It has to be a sizable ore body to warrant the expenditure of a $5-million mill.

Senator MURRAY. I understand that there are a number of small producers there, but I don't know the extent of their production.

Mr. HALL. It is quite small.

Senator MURRAY. On the possibilities for future development, it would require considerable production before a mill could be justified?

Mr. HALL. That is correct.

Senator MURRAY. That is all.

The CHAIRMAN. Thank you, Mr. Hall. If you should think of any further information that might be helpful to the committee, we would appreciate your sending it to us.

We will recess unitl 2 o'clock. Then Mr. W. H. H. Cranmer will be our next witness. I think it will not take too long then to complete the hearing.

(Whereupon, at 12:30 p. m., November 13, 1953, the hearing was adjourned to 2 p. m. of the same day.)

AFTERNOON SESSION

The committee met at 2 p. m., pursuant to adjournment, in room 238, United States Federal Building, Salt Lake City, Utah, Senator George W. Malone (chairman) presiding.

Present: Senator James Murray, member of the subcommittee; Jerome Adlerman, chief counsel for the committee; George Holderer, staff engineer of the committee.

The CHAIRMAN. The committee will be in order.

Mr. Cranmer, will you come forward and identify yourself?

## STATEMENT OF W. H. H. CRANMER

Mr. CRANMER. My name is W. H. H. Cranmer. I am a geologist, and a mine operator. We have been operating in the lead-zinc industry and have been advised by the administration—many of the departments have said that in applying for relief under the tariff we should go into other industries, that we should not attempt to continue in the lead-zinc industry but go into something else. So we now are attempting to go into the business which is known as uranium mining.

We find there the problems are very similar, that many of the things we have encountered, particularly taxes, and the unfairness of certain taxes in lead-zinc mining, are apparently causing some anxiety to those people who have reached the stage of production in the uranium-mining business, and I might say at this point that the Utah Mining Association has made a great study, or quite a considerable study, of this subject, and we would be very happy, I am sure, to have the association furnish you with that study, which would aid, not only in providing relief and proper legislation perhaps for uranium mining, but also for the lead and zinc and other mining industries that are similarly situated so far as taxes are concerned.

The CHAIRMAN. Mr. Cranmer, I will say to you now we have heard already many of the other industries, and, of course, will accept further information, and if you would furnish the committee definitely with such a study we will accept it now as exhibit No. 1 to be furnished the committee later.

Mr. CRANMER. Mr. Romney has volunteered to secure the study and forward it to you.

The CHAIRMAN. The Utah State Tax Commission?

Mr. CRANMER. The Utah Mining Association. Mr. Romney is secretary of the association.

The CHAIRMAN. It will be accepted as exhibit No. 1, and you will furnish it to us later.

(This study was not furnished at the time the hearings were printed. When furnished it will be made a part of the committee file.)

Mr. CRANMER. I have a prepared statement, which I won't try to confine myself to. Many of the subjects have been fully covered by the testimony of others, therefore, I won't confine myself to it, but will depart from this statement.

The CHAIRMAN. You may make any general statement for the record.

Mr. CRANMER. The subjects I am most interested in, after hearing the various testimony, I will attempt to cover in a very short time, because I realize that the committee is limited in time available.

As an independent lead-zinc operator I am interested in free enterprise. I am of the opinion that it would be to the interest of the United States and the administration to support, so far as possible, those small operators and independent operators who are competent to carry on the business that they are endeavoring to carry on in uranium production.

I particularly want to make a plea and back up what my good friend over here has said so far as Mr. Steen is concerned.

The CHAIRMAN. Are you speaking of the testimony of Mr. Brewster?

CONCENTRATION METHODS

Mr. CRANMER. Yes, Mr. Brewster. I say that it would be in the interests of the country to encourage independent operators, entering not only the mining business but the concentrating of the ores in the mills, providing, of course, they have proper and adequate means and they have competent advice from people who are skilled in the matter of reduction of these ores.

There is no secret about it. A good many of the processes are standard, and the Dorr Co. or some other company advising Mr. Steen is perfectly competent to erect a mill that would be as good as any that could be obtained.

Right here I want to say that one of the bottlenecks in this whole situation is going to be concentration of ore. Utah Copper Co. wouldn't be possible, and Kennecotts Utah division wouldn't be possible if it weren't for the discovery of concentration methods that make low-grade ores into concentrates that can be handled at prices and costs that will be economical, and I think it would be well for the Congress or for the AEC to consider offering rewards for the discovery of concentrating methods that would expedite the concentration of ores, both dry and wet.

I am advised that there have been some people working on the methods of concentration, using electromagnetic, or other dry methods that might be very successful, and if they are it would aid greatly to the production of concentrates.

I also want to call attention to the geophysical methods of finding ore. These methods up to date have been very successful on outcrops. That is where the outcrops can be flown over or can be tested by Geiger counters, scintillometers, and other methods. These methods have all been only available to test the surface, say within 18 inches of the surface, because none of these methods have yet been able to penetrate very deeply, and no doubt methods can be developed and will be developed by which ore, buried at considerable depths, could be detected, and that should be encouraged.

Now in entering this new field for us, by the way, we have kept our own lead-zinc mine operating, and we hope to keep it operating in spite of the present low prices of lead and zinc, but we need some stimulation in entering some other field, and since we have been advised by the administration and by Ford and by others, that we should not just expect the Government to help us out of these situations, we are going into the uranium mining business with the idea of applying many of the methods that we have developing in mining and prospecting, and also in opening up properties to the uranium business.

The CHAIRMAN. I am going to ask you right there, isn't it true that these geophysical methods of exploration we talk about were very successful in Africa some years back in the exploration of the mining areas there? I understand that was the method by which they quickly discovered the ore deposits in Africa.

Mr. CRANMER. I believe that is correct, and although I have no acquaintance with it directly, I have read accounts that did state

exactly what you have said. Also, these methods have been very successful in the upper Colorado River Basin. I am advised that one of the big deposits was located by the AEC flying the country, and before they were able to verify it on the ground it was located by some people who had access in some way to the information. Now, that may or may not be correct, but that is a statement I have heard several times from various people.

No doubt the AEC has great difficulty in keeping their findings secret, even though they have the ability, under the statute, to do so. They, of course, have flown a great deal of that country, and many other people have, and not one, but several discoveries have been made in that way.

But that is only on the outcrops. That does not apply in the case of Mr. Steen, because his discovery was made by drilling back of the outcrop, where the outcrop didn't show too much, and we right now are engaged in drilling. We are drilling down on Grandview Point where the Colorado and Green Rivers come together, and we are drilling through about 800 feet of cliff, the cliff above the river. The outcrops are shinarump. There are outcrops on both rivers, all along the rivers, which is a very important potential horizon from which production has been and is being obtained.

Now I might mention there that our idea in going out on this plateau is that we could elevate the ore from below up to the top of this plateau, and then bring it in by a flat road much more cheaply than they can by these wandering roads that go for miles and miles and follow the turning of the rivers. I understand they are building roads down both rivers along this edge of this plateau.

We are drilling on the plateau with the idea that we will develop the ore from below and follow it in on the horizon or bed that is productive, but we will elevate the ore, if any, to the top of the plateau, and there a very good road could be built, because of the nature of the country, and a much shorter road.

I call this to the attention of the committee simply to show that there are advantages of getting experienced mining men into this business.

I think that we can do a good deal to cooperate with the Atomic Energy Commission, and we hope to bring about some developments that would not otherwise be possible.

### LAND TITLES

The most important matter to bring up before this committee is the titles. We have recently acquired about 8,000 acres of State land which is entirely within the Colorado Plateau area. These lands can be developed, and to be developed must have some of the advantages of Government land, and must have some of the advantages that are being extended to privately owned lands. I am happy to report, as it is in this prepared statement, that we have been informed by the Director of the DMEA that he will waive the property lien requirements for projects on State-owned ground.

That will mean it will be possible to get loans from the DMEA to develop State lands that are, of course, sufficiently attractive to their engineers to be feasible, the same as they would be if they were

Government land. I think that the cooperation between the States and the Government should be very close, and that they should not put any obstacles in the way of developing the State land as well as the others.

So far as I know our experience has been that the Atomic Energy Commission has been very helpful and willing to go on that land and run their probes and tests, and so forth, and they have been very cooperative indeed. In fact, I want to say right here, that in a democratic country, where it does not lend itself to these kinds of setups, that we have in the Atomic Commission, we have found that the people who are working for the Atomic Commission are endeavoring to do their job in the very best way possible. It is a very difficult situation because of our democratic country. We have no such setup in any other respect.

There is always plenty of opportunity for publicity and getting information, and so forth. Therefore, I want to express to this Commission our appreciation of their self-imposed limitations and their desire to do the job in a fair and decent way.

The CHAIRMAN. Thank you, Mr. Cranmer. We are very happy to have you before the subcommittee. If there is any further information that you have for us, will you please mail it to us? Would you like to have your statement made a part of the record?

Mr. CRANMER. I would like to eliminate that part of it in which I complain about a certain young man telling me I couldn't go in and see how he has tested the ore. I have taken it up with Mr. Wimpfen, and he advises me that the young man is entirely mistaken.

The CHAIRMAN. Just mark it out and hand it to the reporter, and we will make it part of your testimony.

(The following statement was submitted by Mr. W. H. H. Cranmer, president of New Park Mining Co.)

1. IMPORTANCE OF ADEQUATE SUPPLY OF MINERALS

President Eisenhower, in a letter to Secretary of the Interior McKay, dated October 26, 1953, said:

"We must make sure, as Americans, we have available raw materials adequate to meet any contingency during the uncertain years ahead. The strength to meet any new crisis in large measure will depend upon our ability to obtain these materials in sufficient amounts."

To have the metals and particularly uranium available in a war crisis, production in the United States and Canada must be adequate since the Russians possess a fleet of submarines of the snorkel type and a much improved subsurface mine capable of closing to use every harbor where they can be sown. A glance at the map showing sinkings by a much less efficient German equipment shows the folly of depending on shipments from overseas. Therefore, our Government should make every effort to stimulate the exploration and production of uranium on this continent and, particularly, in the United States where we can control its use.

2. THE PROBLEMS RELATED TO EXPANDING PRODUCTION

(a) There is much being done by the Government in a sincere effort to secure added production of uranium. Operations of the Colorado Plateau, in Colorado and southeastern Utah recently were believed confined almost exclusively to one horizon where carnotite ore containing vanadium and uranium was found in highly variable and limited ore bodies. These deposits were most successfully and economically mined by lessors in small parties. Recently, by the discovery of the Steen and Pick mines, much larger bodies of ores of differing character have enabled mining on a larger scale and with better and more modern equipment, in formations not before looked upon as uranium-producing horizons.

These discoveries open up a new era with great potentialities for increasing the production of uranium if the policies of the Government are constructive and these policies are administered with fairness and sympathetic helpful consideration toward those expending their time and money in an effort to explore and develop the uranium ores.

The New Park Mining Co. and associated companies have only been operating in the Moab area a short time, but we have found the AEC employees most helpful and willing to give us any information or assistance such as running radiometric logs of our wells, etc.

(*b*) I desire to call attention to the desirability of the Government cooperating with the States to secure the development of the State land. In Utah, there are 4 sections of State land, or 2,560 acres in each surveyed township belonging to the State of Utah.

There are many thousands of acres of State lands which are in the surveyed area of southeastern Utah which are potentially capable of producing uranium.

I have just been informed that the director of DMEA has informed us that DMEA will waive the property-lien requirements for projects on State-owned ground. This will make it possible to develop many thousands of acres not otherwise available for the production of uranium and vanadium, and I am of the opinion that it will greatly add to the production from the Moab area and the Utah area within the Colorado Plateau, which has produced in the past and will, undoubtedly, increase production of both uranium and vanadium in the future.

The uranium deposits of Australia are reserved for the British Empire and should we depend upon production from other nations, we could suffer defeat in atomic war.

The atomic age has just begun. The use man makes of this power is the most important decision for everyone that mankind has ever been called upon to make. God grant us the wisdom to make right decisions and use this new force for the good of all people that they may enjoy freedom from oppression and better living conditions and freedom from fear.

The CHAIRMAN. The Uranium Producers Association is here. Will you please come forward, all of you, and you can choose your spokesman or the order in which you present your testimony. Mr. Haldane, if you will, identify yourself for the record.

## STATEMENT OF W. E. HALDANE, PRESIDENT, URANIUM ORE PRODUCERS ASSOCIATION

Mr. HALDANE. My name is W. E. Haldane, of Grand Junction, Colo., president of the Uranium Ore Producers Association.

I would like to introduce my colleagues here, Mr. Leo C. Maley, Dove Creek, Colo., Senator Stephen McNichols from Denver, Colo., Mr. C. R. Hogle from Edgemont, S. Dak., and Mr. M. G. Magrath, of Delta, Colo.

I would like to take this opportunity to express our thanks for being included in the discussions at this time. We want the committee to know that we are fully cognizant of the tremendous responsibilities that are placed upon the shoulders of the Atomic Energy Commission and the Raw Materials Procurement Branch.

We have a few items here that we would like to present to this committee, which we present purely in the interests of an increased efficient and maximum production of uranium ores.

I have a prepared statement which I would like to make a part of the record.

The CHAIRMAN. You may do so, and it will be accepted as a part of your testimony.

(The following statement was submitted by Mr. Haldane:)

The Uranium Ore Producers Association, hereinafter called the UOPA, is vitally interested in the progress of the uranium industry and is likewise fully

cognizant of its obligation to the security and welfare of the United States The association believes that maximum and efficient production and utilization of our domestic sources of uranium ores are of paramount importance in the defense and security of this Nation. It is significant that, despite the fact that uranium production has materially increased over the past few years in the Colorado Plateau area, it could be increased manyfold by cooperative studies and a reevaluation of the raw materials procurement program as outlined in the following text. The association believes that our domestic sources of uranium are of sufficient quality and quantity to closely approach a state of self-sufficiency if proper utilization is made of low-grade ores and ores that are not at this time amenable to existing plant practices; e. g., a stockpiling program for low-grade ores as a ready reserve in case of a national emergency.

The undersigned is writing on behalf of the UOPA which had its origin in 1948 at the time the Atomic Energy Commission raw materials procurement program was getting underway. The membership of the association is in excess of 350 members, most of whom are actively engaged in the production of uranium and the rest of whom are directly or indirectly connected with the industry by virtue of their interest in uranium properties as lessees or lessors, or in some related capacity. The association also has a considerable number of associate members, consisting of various types of business concerns that have a material and financial interest in the success of the overall uranium program because of its economic importance throughout the entire Colorado Plateau area.

The membership of this association is made up of persons from the five principal uranium-producing States in the plateau area, namely, Colorado, Utah, Arizona, New Mexico, and South Dakota. Each of these States has representation on the board of directors of the association. The association has been making an effort to represent the entire production industry in all of its diversified problems. All of the officers and members of the board of directors of this association are actively engaged in the production of atomic-source materials and a number of the officers and directors have been employed by either one or both of the principal uranium-processing companies in the Colorado Plateau, and some of them, in addition, have been previously employed in various capacities by the AEC and the United States Geological Survey in the Colorado Plateau area. The average amount of experience of the 4 officers and 11 directors of the association in the fields of exploration, development, and exploitation of uranium and vanadium ores is in excess of 12 years per man.

The UOPA realizes that this industry is a controlled industry over which the Government exercises extensive control. In the past there has been perhaps legitimate reason for the exercise of unlimited Government discretion in all matters concerning the uranium-procurement program, and it is understandable that great secrecy of necessity had to attend the initial program and all its ramifications. It appears, however, the justification for unlimited control and for complete secrecy, except as to production figures in the field of raw-material procurement, has terminated.

As the industry progresses and takes its place in the economy of the Nation, private enterprise should be encouraged at the source-material procurement level. The economic forces of free competition should be allowed to operate freely wherever and whenever possible. Such was the intent of Congress, and the Atomic Energy Act so provides. Any industry subject to complete domination and control by a government must, of course, be monopolistic in character. The wisdom of allowing private enterprise to participate and the extent of their participation in other phases of the program must, of course, be determined by the AEC and other high policymaking authorities. The UOPA feels that certain of the policies at the source-material level should be revised. Their revision, the association believes, would be mutually beneficial to the Government as well as the producer, with a resultant increase in production at greater efficiency.

The many hundreds of uranium producers in the entire plateau area feel that perhaps the raw-materials procurement program has not been receiving attention commensurate with its importance by the AEC. It is conceded that the procurement of source material, along with the engineering and scientific research, is basic to the overall atomic-energy program. The industry in the plateau area has grown to be a large industry, and its strategic importance as well as its economic importance to the economy of the area cannot be overestimated. The mining of uranium and vanadium has become an important segment of the American mining industry.

In the interests of the uranium mining industry, the UOPA has devoted its efforts in the past to securing access roads and fair and equitable ore-sampling procedures at the processing mills. It has also spent considerable time and effort in urging the passage of Federal legislation resolving conflicts between uranium and vanadium claims located on lands covered by oil and gas leases, as well as in furthering many other projects. The UOPA has made a sincere and determined effort to work with the local AEC Raw Materials Branch in Grand Junction, Colo.; and has made an attempt to resolve problems at the conference table with local officials. The efforts, at best, have resulted in only limited success; and more recently, the Procurement Branch has resorted to a policy of blind justification at any cost.

An example of the great difficulty experienced by the UOPA in effecting the solution of a very serious problem, namely, the problem of ore sampling, graphically demonstrates the reluctance on the part of the local Raw Materials Branch to effectively and efficiently handle the production problems at this level. The UOPA, for more than a year and a half, constantly pointed out to the Grand Junction office that the sampling procedures in use at virtually every Government-licensed mill in the plateau area were patently defective. The UOPA was constantly and continuously told that the AEC had been watching the plants and inspecting them and that the plants were accurate and in good condition. It was only by soliciting the aid and assistance of the congressional delegation from Colorado that an independent study of the sampling plants was made by the Colorado Schools of Mines Research Foundation.

It was the UOPA that suggested this independent study be made, and the results of this study decisively proved that the contentions of the UOPA were substantially correct. This specific situation indicates very clearly that the local office at Grand Junction devoted greater efforts toward rationalizing and justifying the evil than it would have taken to correct the evil. Every producer in the plateau suffered financial loss by its failure to resolve the problem. Not only that, the Government of the United States suffered financial loss on royalties to which the Government would have been entitled had the processing mills been properly sampling the ore.

The manner in which the AEC has been granting leases on public domain has been the subject of severe criticism in the plateau area for a considerable length of time. The UOPA began discussions with the local AEC in January of 1953; and after considerable discussion was had, the UOPA submitted a formal proposal in March of 1953 to correct the evils of the present arbitrary system of lease allocation. Shortly after the UOPA proposal was submitted to the local AEC, the UOPA was informed that, on May 1, 1953, a new policy on allocation of leases would be put into effect. To date, this has never been done. It is felt that the present system of leasing lends itself to criticism and abuse and does not constitute a fair and equitable manner of leasing the public domain. We have recently been informed that there are approximately 300 applications for Government leases on file with the AEC. Each of these applicants feels that he has a right to an equal opportunity to obtain a Government lease and that, when a lease is available for allocation, each qualified applicant should be considered on a fair and equal basis with other applicants and should likewise be advised of the reason or reasons why his application was not selected.

Leases have recently been granted to individuals and companies whose applications have been filed as of very recent date, despite the fact that other qualified applicants have had their applications on file for as long as 3 to 4 years. A recent field investigation made by the local AEC to determine the acceptability of the present leasing program was made, and the UOPA feels that the investigation and the results obtained therefrom do not represent the actual situation nor do they represent an accurate expression of opinion on the subject. As a matter of fact, an independent investigation made by the UOPA indicates that the present leasing policy is entirely unacceptable and should be drastically revised. Many applicants refuse to express an opinion publicly for fear that they will not receive consideration on Government drilling or because they fear they will not be considered when Government leases are granted.

Several applicants who thought their applications were being considered found months and even years later that their applications had been disqualified for some technical point and were not being considered, nor were the applicants so advised.

When the AEC issues a lease on Government-withdrawn land which has been drilled and explored by the Government, the lease contains a provision which is known as a directed-ore clause. This directed-ore clause permits the

Government to direct the ore mined from the lease to any mill the Government wishes. This directed-ore clause has been the subject of much criticism on the plateau, and even though it directly affects only those producers producing by virtue of their Government lease, its ultimate effect and impact on the industry is very great. It is reported that the directed-ore clause was originally inserted in the leases because the Government was committed to provide certain mills with a certain quantity of ore in return for the rehabilitation and remodeling of the mills. The terms and conditions of the commitments to these mills have not been made public and are not available to the association.

The directed-ore clause has presently outlived its usefulness. This fact is made more evident and is confirmed by a statement made by the manager of AEC's Colorado office in Grand Junction, disclosed at the American Mining Congress in Seattle on the 23d of September 1953, when he stated that domestic uranium mining is growing faster than the mills can handle the ore.

In the continued use of the directed-ore clause, it is suggested that the Commission tends to foster poor or inefficient milling practices and inefficient utilization of source material. We respectfully submit the following for consideration:

1. Directed ores are, in most cases, above average grade. By directing higher grade ores to processing plants in financial or recovery difficulties, poor operations or mill practices can be partially covered, because milling costs tend to lower while recovery tends to go up with higher mill heads. Lower-grade ores, therefore, are not properly utilized, and the miner or lessor is penalized for the profit or benefit of the processing plant.

2. The Commission permits the rejection of high-lime ores. High-lime ores have little effect on uranium recovery, although reagent costs may be higher. Vanadium recovery is materially affected.

3. The Commission permits some of the processing plants to reject low vanadium-type ores. Ores of this type have no effect on uranium recovery; but with existing practices, vanadium is difficult to precipitate from low-grade solutions.

4. On the other hand, producers of high-vanadium-, low-uranium-content ores are penalized for surplus vanadium at Government-controlled plants. The recovery of uranium from these ores might suffer slightly, but efficient blending could materially benefit uranium production.

5. It is felt that the secretly negotiated contracts with the processing companies can cover poor techniques, poor mill practices, or poor mill design.

There appears to be more than sufficient evidence that uranium recovery is being given secondary consideration and vanadium recovery is being given primary consideration. Since the Commission is vitally interested in a sustained acceleration of uranium production, a review of some of the features of the purchasing program would seem to be in order. It seems to be unexplainable that the large processing companies who own and are in possession of a majority of the most productive claims and areas are curtailing their own production. Not only is this true, but the AEC has granted large leases to these companies, although they have sufficient reserves of their own which they are holding in abeyance. In the meanwhile, they are receiving the benefit of directed ore from Government leases.

It is a matter of public record that United States Vanadium Corp. and Vanadium Corp. of America are presently under Federal prosecution for criminal conspiracy to fix prices and monopolize the vanadium industry. It is by reason of these illegal acts that they now occupy a dominant position in the vanadium and in the uranium industry. It is generally accepted throughout the plateau that some of the present AEC policies are strengthening the monopolistic positions of the large companies, and, in effect, are placing them in a more favorable position to continue and expand their monopoly, not only in the vanadium industry but ultimately to the uranium industry. When the marginal ore deposits are depleted, these large companies, who refuse to actively produce their properties and currently prosper from directed ore, from Government drilling, and from Government-allocated public lands, will be in a controlling position with their untouched reserves.

The UOPA suggests that, if the directed-ore clause were abandoned, or at least suspended for a fair trail period:

1. The mills would compete for ore purchases and would be required to make better terms and conditions of payment.

2. Friction and tension would be reduced between the mills and the producers, and a better relationship would evolve.

3. Competing mills would be forced to correct their sampling plants and would agree to set up assay umpiring procedures which would be fair in all respects to both the seller and the buyer.

4. If all mills would allow producers to blend and build up their ore for a reasonable period, conservation of uranium reserves would result. Presently substantial quantities of low-grade ore are not being mined and are covered up in strip-mining operations, or they are being relegated to mine dumps. However, if the producer were allowed to blend and build up his ore at mills, much of this lower grade uranium could be blended with the higher grade uranium, and conservation and utilization of uranium would result.

5. All mills would be assured of an adequate supply of ore as long as they accorded fair and equitable treatment to the producers.

6. Mills that desire high vanadium ore would be able to purchase and complete for the ore most amenable to their plant operation, and mills desiring low vanadium content ores would compete for this type of ore.

7. Government mills would not be inclined to impose the 10-to-1 ratio penalty on high vanadium ore, such as is now being imposed in the Indian reservation areas of New Mexico and Arizona, as well as other plateau areas where Government mills are in operation, because the mills that desire high vanadium content ore would be encouraged to induce the producer to sell such ore to them.

The Government drilling and exploration program, though the most desirable of the Government-sponsored programs, does not appear to be conducted on an objective basis. It is believed that certain companies and individuals are able to get claims and properties drilled to the exclusion of others. Certain companies get drilling who could well afford to pay the costs of their own drilling without Government aid. It is conceded that some drilling for geological purposes is obviously necessary. Perhaps consideration should be given to a policy of curtailment in Government drilling with a simultaneous liberalization of Government loans to private industry. Private drilling can be done much less expensively than Government drilling. This can be proved beyond the shadow of doubt when all costs of drilling operations are accurately figured on a cost accounting basis, with all elements of cost included.

Such a policy, together with an appropriate and realistic price increase, would undoubtedly increase the discovery rate, increase production, and bring about a substantial decrease in the overall cost of the procurement program. This type of program would insure reimbursement to the Government on successful and productive drilling operations similar to DMEA procedures. A program of this type would spread the benefits of Government aid among a greater number of producers and could be administered by and through existing agencies.

The UOPA suggests that the AEC "withdrawal policy" should be reevaluated. Various Members of Congress, during recent hearings concerned the validation of uranium claims on lands covered by oil and gas leases, indicated a special interest in the withdrawal policy now employed by the AEC. The declared policy of the AEC regarding withdrawals of public domain from mineral entry was to withdraw only those areas that private enterprise would not explore and develop. Areas have been withdrawn and are now withdrawn that private enterprise, operating on private capital, has always been and would now be most anxious to develop and explore. If local miners, prospectors, and producers were permitted to prospect and develop these areas, a startling increase in the discovery rate would occur and increased uranium production would result. It is generally felt that the AEC should make restorals of public domain commensurate with withdrawals. This policy would afford private industry an opportunity of developing and producing these areas on a maximum basis.

For example, a letter in the files of the UOPA presents the following case:

Two prospectors were prospecting a rugged, isolated mesa in the plateau area in May of 1952, and discovered uranium ore. Acting in good faith, they located five claims and performed the necessary steps to insure holding of the claims under the mining laws of 1872. Subsequent development work, including the building of an access road, cost them in excess of $3,000. The locators then found that the property they held had been withdrawn by the AEC under Public Land Order No. 494, under date of July 7, 1948. The locators found, upon investigation, that the AEC had done nothing on the property, nor had any immediate intention of proving that property. Therefore, the locators believe that, in view of the fact that the AEC has done nothing on this property for 5

years and has incurred no expense whatsoever, the locators should have the right to enter upon the property and develop and mine the ores contained therein, which were discovered by their ingenuity and at their expense.

The field of uranium price structure offers a fertile ground for suggestion, study, and discussion. The industry was most gratified to learn of the continuation and extension of ore prices released on September 23, 1953, which undoubtedly will have a stabilizing effect on the industry. Cooperative research regarding the costs of uranium production between the producers and the Government should be conducted. Present price schedules are arbitrarily established, and a study of the situation will reveal, for example, in some areas where vanadium is found in conjunction with uranium, producers are able to produce under present prices, but in other areas where vanadium is not prevalent, large bodies of ore that run relatively low in uranium, although the percentage is within the buying schedule set up by the Commission, cannot be produced profitably. The AEC cost-of-production studies from the Cougar properties, although they have never been publicly announced, undoubtedly will reveal that present prices may not be adequate to stimulate full production and that present price schedules are responsible for a lack of production.

The files of the UOPA contain cost analyses of several operations throughout the plateau, and from them the following conclusions are drawn:

1. The basic price schedule is inadequate for ores with a uranium content of less than 0.20 percent $U_3O_8$. However, a spokesman in the local raw-materials office once remarked that the AEC was not interested in the low-grade ores of the plateau.

2. The basic price schedule is inadequate for average or better grade uranium ores when there is little or no vanadium content. For example, a pioneer and one of the largest producers in a relatively new area shows the following costs for a year's operation on ores averaging approximately 0.25 percent $U_3O_8$ and 0.65 percent $V_2O_5$.

| | *Per ton* |
|---|---|
| Gross income (including premiums and allowances, but no bonus) | $24.98 |
| Operating expense | 33.01 |
| Net loss | 8.03 |

If and when he receives the bonus he is entitled to, the property will show a small profit, but probably not commensurate with the risk involved. A further breakdown shows the following distribution of his costs:

| | *Per ton* |
|---|---|
| Exploration (drilling and gamma ray prospecting, examination of properties) | $16.227 |
| Development (stripping, adits) | 3.080 |
| Mining | 13.703 |

A further example of existing inequities of the present purchasing program are contained in the following announcement of the United States Vanadium Co. Although entitled "High Lime Ore Price Schedule," item 5 applies to any type ore.

"The United States Vanadium Co., as buyer, is interested in purchasing, subject to the terms and conditions of the Atomic Energy Commission's Domestic Uranium Program Circular No. 5, Revised, March 1, 1951, High Lime Carnotite Ores, under the following conditions:

"(1) High lime ores to be purchased must be amenable to treatment in the plants of United States Vanadium Co. and must contain less than 15 percent lime calculated as $CaCO_3$. Ores requiring research will be considered under special arrangements.

"(2) The prices paid are the same as circular No. 5, revised, referred to above, except for the following deductions:

"Ores containing more than 6 percent lime calculated as $CaCO_3$ will be subject to a base penalty of $1 per net ton plus $0.04 for each one-tenth of 1 percent lime calculated as $CaCO_3$ per ton of ore above the no penalty limit.

"(3) Ores from each individual mine will be averaged for the pay period. Ores from several mines will not be averaged.

"(4) The penalty will apply to high lime ores delivered to Thompson and Rifle ore purchasing stations, where the buyer reserves the right to limit the volume of ore to be purchased.

"(5) Ores assaying less than 0.10 percent $U_3O_8$, or having a value of less than $15.25 per ton, no payment. Any such ores which are delivered to the buyer shall, unless otherwise specifically agreed to by the buyer, become the property

of the buyer as liquidated damages for buyer's expense of weighing, sampling, and assaying, and after sampling may be placed in process, commingled with other ores, or otherwise disposed of by buyer.

"(6) The United States Vanadium Co. reserves the right to change the aforesaid prices and conditions relative to the purchase of high-lime ores without advance notice.

"(7) The effective date of this announcement is January 16, 1952."

The matter of uranium procurement, so inextricably interwoven with our national security and the economic well-being of so many persons, as well as a large area involving at least six States, is entitled to more mature consideration by those responsible for the conduct of so vital an operation and by those who are obliged, in the interest of good citizenship, to aid our Government in all its endeavors.

Therefore, in summary, the UOPA respectfully submits the following points for the consideration of the United States Senate Minerals, Materials, and Fuels Economic Subcommittee in the interest of efficient and increased uranium production:

1. We recommend greater utilization of low-grade ores by the purchase of material containing 1 pound or more of uranium oxide per ton and stockpiling for future or emergency use, or by giving the processing plants the incentive to blend low-grade ores more efficiently with current mill heads to prevent the wasting of a valuable national asset.

2. We recommend a revaluation of ore-purchasing practices currently in effect at both private processing plants and Government plants. Specifically, in regard to 10 to 1 ratio, high-lime ores, roscoelite ores, and the minimum grade and minimum-value clauses contained in contracts between the Government and the USV and VCA.

I have a specific example of the minimum-value clause where an operator shipped in nine loads of ore subject to USV's minimum-value circular. The ores were commingled with the rest of the ore, with their current purchase ores, as liquidated damages for not approaching the value of $15.25 per ton. The particular reference I make is to item 5 on page 10 of this paper:

Ores assaying less than 0.10 percent $U_3O_8$, or having a value of less than $15.25 per ton, no payment. Any such ores which are delivered to the buyer shall, unless otherwise specifically agreed to by the buyer, become the property of the buyer as liquidated damages for buyer's expense of weighing, sampling, and assaying, and after sampling may be placed in process, commingled with other ores, or otherwise disposed of by buyer.

The 10th load was scaled at the purchasing plant and said to be of insufficient value to meet the requirements and was rejected. The first load that was actually rejected, the operator took that load in to the Monticello plant where it ran better than 0.23 percent $U_3O_8$, which was well within the $15.25 and the minimum value. [Reading:]

3. We recommend a more equitable method of allocating Government leases. We submit that thousands of acres of withdrawn land would be explored, drilled, and developed by private enterprise with a resultant increase in ore reserves and production if the land were restored to entry or leased to private enterprise at a nominal royalty.

4. We recommend the elimination of the directed ore clause from Government leases, in the knowledge that the processing companies are complacently utilizing the directed ore and curtailing their own operations. Interference with the free flow of materials and the stifling of competition hampers development and exploitation, is monopolistic in tendency, and can be used as an iron curtain of secrecy to cover poor and inefficient milling practices.

5. We recommend a revaluation of the price structure. Basically, the production of uranium is directly proportional to the price per pound, with or without the subterfuges of premium allowances and bonuses. The premiums, allowances, and bonuses serve the purpose of complicating the tax problems and creating additional red tape of an administrative and clerical nature.

6. We recommend that a board composed of source material producers be created to advise in an advisory or consulting capacity in regard to high-level policymaking of the raw materials procurement program.

7. Greater depletion allowance.
8. Liberalized Government drilling loans.

That is loans specifically in regard to small operators. Many small operators can equal a few large operators. It isn't many thousands of dollars that are needed in exploring and developing of property, it is the need of hundreds or a few thousands of dollars. If those amounts were made readily available it would materially increase production in a very short time.

That is the list of our recommendations. [Reading:]

The officers, directors and members of the Uranium Ore Producers Association wish to express their thanks to the chairman and members of the United States Senate Minerals, Materials, and Fuels Economic Subcommittee. We will cooperate to the best of our ability in furthering the interests of the uranium mining industry which is so vital to the welfare and security of the United States.

Respectfully submitted.

URANIUM ORE PRODUCERS ASSOCIATION,
W. E. HALDANE, *President.*

The CHAIRMAN. Then your statement will be part of the record. Would any of your associates like to make any statement?

Mr. HALDANE. Mr. Chairman, we do have a couple of specific problems here, one in regard to economic management, and another of low vanadium content.

## STATEMENT OF CLYDE BOYLE, SODAC MINING CO., EDGEMONT, S. DAK.

Mr. BOYLE. I am Clyde Boyle. I am a professional engineer and manager and partner of the Sodak Mining Co. in Edgemont, S. Dak.

In connection with the economics in a new area, I have some figures, and I want to tell the origin of these figures and the basis for them.

The information I have pertains to the Edgemont area, which is a new area, and the experience may be local. However, the same experience may occur in other new areas, and for that reason I think it is important to this meeting. The figures are from the monthly operating statements of our company. I checked up the operation for the first 6 months of 1953. The reason I explain this is that those months give the best picture, and also during those months we enjoyed the best production. Those operations were most continuous, as we were set up and completely able to operate at the beginning of this period. The figures are simply this. The operation without the bonus shows a net profit of $2.45 per ton. The operation with the bonus shows a net profit of $18.70 per ton.

In the $2.45 there is not room to amortize your investment, and oftentimes you will exhaust that and more investment in continued exploration. So as far as $2.45 per ton goes, it does not go anywhere at all. The $18.70 allows for exploration and some amortization.

The experience that I want to impress on this group is this, the two largest producers, one other company and my own company, are now out of bonus money. We have exhausted the 10,000 pounds allowance given to us. The effect of that is this. It is unwise to continue. We must hunt a new property on which we can have a new certification. The bad result of that is this. In one instance it leaves a property two-thirds unexploited, with an excellent possibility for valuable ore

deposits still in the ground. That property will remain unattractive, and that ore, as far as I can see, be left in there.

Efficiency of operation, if we could improve it, would brighten the picture a little bit. However, development and mining costs are low compared to exploration costs. We do our own exploration work, and oftentimes when we are out of ore, the entire operation is on exploration work. This exploration work will consume a large, and sometimes the largest part of the total cost per ton.

Now in conclusion I would like to make these suggestions. To fully utilize the possibilities for ore it would be helpful:

1. If we could have smaller subdivisions for certification.

2. If we could have additional certifications where warranted; that is within one property.

3. If we could have a more efficient drilling assistance in our exploration from the Government.

To carry that a little further, I have a wagon drill with which I can drill to 100 feet, and I have an ore body going into a hillside. I have drilled to the maximum depth that I can, and the ore body may continue on. Well, I don't say it does because I am not over there at the moment. However, I can't explore any deeper. If there was a rig in the district that would carry on that deeper exploration at cost to us, it would help us considerably. My experience isn't the only one in the district.

4. A liberalized and speedier form of DMEA assistance or similar assistance should be provided. The present setup, and I don't mean to sound ungrateful, is very slow and ponderous. It is a matter of principle with them to be very widespread in their attack on an area, even as small as one property or as large as an entire area. I refer to the spacing of the holes. It does not seem to be as efficient as it might be. Some areas are different than others.

5. If we could have a higher base price, coupled with tax relief, it would help the development of lowgrade areas.

I think that is all.

The CHAIRMAN. Do you have any questions, Senator Murray?

Senator MURRAY. These matters are highly technical and should require very careful study of the committee. I think it is very important we should have this testimony. I noticed when you were testifying here, there was one point I was very much interested in, your recommendation of a reevaluation of the price schedule.

**Basically, the production of uranium is directly proportional to the price per pound, with or without the subterfuges of premium allowances and bonuses. The premiums, allowances and bonuses serve the purpose of complicating the tax problems and creating additional redtape of an administrative and clerical nature.**

That is very important. It will require thorough study on the part of this committee. They will have to have expert assistance to help to analyze some of this testimony, but I think this is one of the most important hearings that a congressional committee has ever engaged in.

Mr. HALDANE. Senator Murray, we have a good specific example. In regards to depletion, depletion is sometimes a figure of speech. In other words, in this particular case, the amount of depletion which was allowed was 2 percent.

Mr. MALEY. I could make a comment.

The CHAIRMAN. Yes, go right ahead. Is that all?
Mr. HALDANE. Yes.

## STATEMENT OF LEO MALEY, DOVE CREEK, COLO.

Mr. MALEY. I am Leo Maley. I have no title. I am an accountant, and I have prepared a statement pertaining to uranium mining and tax problems, and I would like to state that this only covers one problem. We have many, many problems, and some of them are not as important as depletion. Others are as important.

We also have one additional, which I did give a report on, trucking, which has been brought up. I didn't think it would come up. I prepared a report 2 years ago on the cost of trucking, and actually made a survey of more than 40 trucking operations, and we did arrive at some definite costs per-ton-mile, and that report we would be happy to send in, or to the committee if they desired to have it.

The CHAIRMAN. You can make any general remarks you care to make, and submit your statement for the record. The committee would appreciate it. And then if you feel this trucking review would be helpful to us, you could mail it to us. About how many pages is the review?

Mr. MALEY. About seven pages.

The CHAIRMAN. Well, we could accept it as exhibit No. 1 of the testimony of the Uranium Producers Association, if you can mail it to the chairman at the Senate Office Building.

What is your address?

Mr. MALEY. Dove Creek, Colo.

I would like to make just a statement or two along this line. The theory of depletion, and the theory of a lot of things, the theory always sounds a lot better than actually the figures come out, and in the normal procedure of any business, the operator of that business bases the selling price of his product upon the theory that the cost of producing the product, plus a reasonable margin of profit, should result in the actual amount that the product is sold for.

Our entire system of economics is based upon the theory of individual endeavor and profit. A man's stature in the economic world today is measured by his ability to make a profit. Just as the security of our Nation is of importance, so is the security of the individual.

As far as uranium is concerned, it looks like there will be continued and increased production of this strategic material.

Whenever a fellow fails to realize a fair and reasonable profit, commensurate with the risk involved, we feel there must be something basically wrong with that type of venture. The number of individual miners and mining companies that are realizing a reasonable profit is very small in comparison with the number of miners that are operating at a margin of profit that is economically dangerous from the standpoint of continuing their activity.

The security of our Nation and of our hemisphere, the security of our miners is threatened in a controlled industry with a ceiling price put on the end result, but costs are allowed to increase. There is always a danger that the margin of profit will decrease to the point that it will no longer be attractive to those who are already in the

business or those who would like to enter the field, and with that I would like to state that I have prepared one case history, and it has to do with this depletion.

CASE HISTORY

One of the witnesses stated that we should have an increase to 50 percent. My experience as a mining accountant, and in the preparation of many mining income-tax returns, I find that roughly in 90 percent of the returns which I prepare the depletion allowance of 15 percent is never ever able to be taken by the producer, and unless we can get a change in the 50 percent limitation on the net income or net earnings, unless that can be changed, an increase in depletion allowance would not have any basic effect of improving the status of the uranium miner, and to prove that point I have here an actual return that I filed last year. It is prepared to the best of my ability, based upon our interpretation of the Internal Revenue Code, and based upon our experiences in mining, and also based upon the intent of Congress when they made these rules. It has the adjustments that have been made by the interpretation of the Internal Revenue Code, developed from our own experience, and these are the figures.

The gross income from mining was $226,545.64, less royalties paid of $27,635.94, leaving an income subject to depletion of $198,909.70. We computed the depletion at 15 percent, getting a figure of $29,836.46, with a net profit from operation of $28,947.50. Then we deduct the net operating loss deduction, which seems to be perennial with mining of uranium the first year. Any mining company that sets up a constructive program for continued activity always seems to have quite a net operating loss the first year, and this was also true. By the way, this particular case history is considered to be one of our best uranium mining companies on the plateau. There was a net operating loss of $19,394.91, reaching a net taxable income for the year of $9,552.59. Now the income taxes paid on that income was $2,865.78, which was paid.

Recently the Bureau of Internal Revenue called me in, and I went in, I believe, on four tax cases now. I am batting 1,000. I haven't concluded why yet.

As adjusted by the Bureau of Internal Revenue, the gross income from mining was the same as we had filed, less royalties paid, $27,635.94; less development allowance of $15,667.10, less hauling allowance of $24,637.25. The total exclusions from gross income subject to depletion were $66,940.29, against our interpretation of $27,635.94, leaving an adjusted gross income subject to depletion of $158,605.35; 15 percent depletion allowance computed on that would amount to $23,790.81. Our computation was $29,836.46, so we had an excessive deduction of $6,045.65. This was due to the disallowance of hauling and development, and of applying the 50 percent limitation rule. The loss of net operating loss deduction of $19,394.91 was disallowed, due to disallowance of depletion computation before net operating loss deduction, so the increase in net taxable income for the year was $25,440.56, making an increase in income taxes payable of $9,830.66.

A summary of these adjustments. No. 1. The value of the property was decreased by $226,545.64, the value of the ore which was removed from the property.

2. The depletion allowance was decreased from $29,836.46 to $4,395.90.

3. The tax on income was increased approximately 443 percent, from $2,865.78 to $12,696.44.

4. The depletion allowance was decreased from 15 percent to approximately 2 percent.

Now this was due, we hope not due to our ignorance, but it is due to our interpreting of these rules and regulations as set down in the Internal Revenue Code, and this is what is actually happening, not what is happening theoretically, and we do need a definite change in the depletion structure, but with that, in order to increase production of uranium, would have to come some other very important tax revisions along that line.

The CHAIRMAN. Have you in your paper detailed recommendations as to what these changes should, in your opinion, be?

Mr. MALEY. No, sir.

The CHAIRMAN. Would you do that? We will accept this as a part of the record, and you can then supplement your testimony. Mail it to the chairman at the Senate Office Building, and make whatever definite recommendations that you feel should be adopted.

Mr. MALEY. Is that as to changes in the Internal Revenue Code?

The CHAIRMAN. Any recommendations you may have that you think may be helpful. That is what we want to find out, just as Senator Murray has said.

(The following statement was submitted by Mr. Leo C. Maley.)

URANIUM MINING TAX PROBLEMS

The complexity of the subject of taxation is such that it is very difficult for anyone to easily analyze the various and many taxes that we pay in order to stay in business and to follow our various mining pursuits.

Our first problem is depletion. We are confronted at the present time, with an opinion from Washington regarding the depletion deduction of hauling and development allowance of uranium ores.

For income-tax purposes, the definition of depletion is defined as a reasonable allowance for the exhaustion of natural resources, which in our case is caused by the mining and shipping of uranium and vanadium ores to the mills.

Beginning with 1932, discovery value was replaced by the percentage of gross income applicable which in the case of uranium and vanadium mines, is 15 percent. As in the case of oil and gas wells, if the taxpayer's operations extend beyond the field of extraction, and the product of the mine is transported or processed by him, then the gross income for the purpose of computing percentage depletion includes only the value attributable to mining. Beginning with 1944, determination of the value attributable to mining is covered specifically by the code. Under the code provision the term "gross income from the property" is limited to the value attributable to mining, and the term "mining" includes also the transportation of ores or minerals (whether or not by common carrier) from the point of extraction to the plant or mills. However, there may be included only so much of the transportation as is not in excess of 50 miles unless the Secretary of the Treasury finds that the physical and other requirements are such that the ore or mineral must be transported a greater distance to such plants or mills. As in the case of oil and gas, percentage depletion is limited to 50 percent of the net income from the property.

The reason for my giving the definition of "gross income from the property," and the relationship that the depletion allowance has to gross and net income, is that recently an opinion was handed down by the Special Technical Services Division of the United States, which is adverse to our belief that the development allowance and the hauling allowance are subject to the 15 percent depletion allowance. The Internal Revenue Department has accepted the opinion of the Special Technical Services Division, and it is going to work a terrific hardship on the uranium miners if it is allowed to become fact, instead of opinion.

The reasons set forth for disallowing a percentage depletion of development and hauling ore are based upon a section of the Internal Revenue Code, which states that any amounts of money which are paid to the miner for the exploration, development, or mining of uranium ores and for which an accounting is made or required to be made to an appropriate Government agency is not considered to be eligible for the percentage depletion allowance. It is not, however, applicable to any part of the purchase price of uranium ores, and it is our belief that the development allowance does not meet the requirements of having to be accounted for, in the sense of accounting for an expenditure as set forth in the code. The reasons for our belief are that the leases executed by and between the AEC and the miners calls for a contract, and I quote paragraph 3N which states, "The lessee agrees to expend the development allowance of 50 cents per pound solely for development work on the leased premises."

The AEC does not require that the miner account in any specific way as to how he spends the development allowance. He merely certifies to the AEC that he has spent an amount equal to or in excess of the amount that he received. The fact is, if the grade of the ore shipped is less than 0.10, he receives no development allowance, even though the ore could have contained 1.8 pounds of $U_3O_8$ per ton.

The development allowance has no direct relationship to the amount of development done, but it does have a very direct relationship to the amount of $U_3O_8$ produced. Therefore, we feel that it is a part of the purchase price of the uranium mined and sold by the miner.

With regard to the hauling allowance, the opinion as set forth by the Special Technical Services Division states that, and I quote, "The payment of 6 cents per ton-mile for transportation of ore from the mine to the purchasing depot is not in any sense, income from the ore."

The 1950 Revenue Act amended section 114 B4 of the Internal Revenue Code, to provide that hauling up to 50 miles from the mine to the mill should be considered a mining process. The opinion of the Government is that because the milling of the ore is not done by the miner, the ore transportation from the mine is therefore beyond mining and not subject to the depletion allowance.

We believe that whether the miner or anyone else does the milling of the ore, the transportation of the ore and the allowance for that transportation is the same and it should not be necessary for the miner to have to mill the ore in order to benefit by the depletion allowance.

In other words, it would seem that if any of the mills had mining properties, they would receive the depletion allowance on hauling, but an independent miner, shipping to the same mill, from an adjoining property, would not be able to receive the depletion allowance.

This would be directly discriminating against individuals in a controlled industry, and they would have no control whatsoever of their transportation costs, due to the directed ore clause.

As in the case of our belief that the development allowance is actually a part of the purchase price of $U_3O_8$, we contend that the hauling allowance is also a part of the purchase price of uranium because it has a direct bearing upon the grade of ore shipped. If the ore shipped does not contain at least 2 pounds of $U_3O_8$ per ton, there is no hauling allowance, even though the transportation costs are the same as if it were a much higher grade of ore. The hauling allowance is tied in much more directly to the grade of ore produced than to the miles of transportation involved.

This is borne out in the recent changing by one of the larger mills of uranium ores to allow the miner a greater hauling allowance for higher grade ores, with no regard whatsoever to the mileage involved.

It is our opinion that the loss of the depletion allowance of the hauling and development can very easily mean an increase in the income taxes of miners on the Colorado Plateau in excess of a million dollars a year.

We are confronted with rulings which are based upon other types of metal mining. Yet uranium mining is peculiar in that it has several features which are different from other types of metal mining and therefore it is necessary that we should have rules which will cover these peculiarities.

A recent development regarding Defense Minerals Exploration Act loans made to uranium miners by our Government and the method of repayment of such loans seems to bear out our contention that the depletion allowance should extend to the development and hauling allowances. The Bureau of Interior recently rule that in repayment of a DMEA loan, the development and hauling

allowances would be considered to be gross income from mining, and therefore, the rate of repayment would apply, the same as it would on the uranium and vanadium values.

We believe that the same rules should apply to all bureaus of our Government as to definitions of "gross income," and their applications to uranium mining.

The following case history of one of the more successful uranium mining operations bears out the results of the differences in opinion as to the definitions and applications of the term, "What constitutes income from mining, subject to depletion allowances."

*Case history (as filed on Form 1120 for year 1952)*

| | |
|---|---|
| Gross income from mining | $226,545.64 |
| Less royalties paid | 27,635.94 |
| Income subject to depletion | 198,909.70 |
| Depletion computed at 15 percent | 29,836.46 |
| Net profit from operation | 28,947.50 |
| Net operating loss deduction (carried over from 1950) | 19,394.51 |
| Net taxable income for year | 9,552.59 |
| Income taxes paid on income | 2,865.78 |

AS ADJUSTED BY BUREAU OF INTERNAL REVENUE

| | | |
|---|---|---|
| Gross income from mining | | $226,545.64 |
| Less royalties paid | $27,635.94 | |
| Less development allowance | 15,667.10 | |
| Less hauling allowance | 24,637.25 | |
| Total exclusions from gross income | | 67,940.29 |
| Adjusted gross income subject to depletion | | 158,605.35 |
| 15 percent depletion allowance | $23,790.81 | |
| Amount claimed | 29,836.46 | |
| Excessive deduction (due to disallowance of hauling and development) | | 6,045.65 |
| Loss of net-operating-loss deduction (due to disallowance of depletion computation before net-operating-loss deduction) | | 19,394.91 |
| Increase in net taxable income for year | | 25,440.56 |
| Increase in income taxes payable | | 9,930.66 |

SUMMARY OF ADJUSTMENTS

1. The value of the property was decreased by $226,545.64.
2. The depletion allowance was decreased from $29,836.46, to $4,395.90.
3. The tax on income was increased approximately 443 percent, from $2,865.78 to $12,696.44.
4. The depletion allowance was decreased from 15 percent to 2 percent.

Another tax that seems most unfair to the uranium miner is a tax known as a production tax, which is imposed by the various counties, upon the uranium miner. This tax is based upon the value of ores produced and is defined as a tax in lieu of an ad valorem or property tax. In all other cases of taxes levied against property, the tax is paid by the owner of the property, and the tax is charged against the owner of the property. The uranium miners believe that they should not be subject to this tax, or compelled to pay such a tax for the following reasons, to wit:

1. The tax is computed on assessed valuation of the mining property.
2. The assessed value is based upon the actual value of the ores produced.
3. The Government owns the ores extracted, and in most cases, are the actual owners of the mining property.
4. The miner is paying a property tax on property which he does not own.

The intent of the income-tax rules and regulations is at least as important, if not more so, than the interpretation or opinion of individuals who may or may not be familiar with uranium mining. We certainly need some immediate action

on the clarification of the intent of Congress as pertains to the conflicting opinions, as are now being used. The final ruling on these points can make or break hundreds of miners, large and small, and could seriously affect our atomic energy program at its roots; the individual uranium miner of today.

Senator MURRAY. I might ask you, Mr. Maley, how recently have you had this before the Internal Revenue Department?

Mr. MALEY. Sir, this is the first year. I have been in mining accounting since 1949. Now this is the first year that we have had any opportunity to have our methods of accounting and preparing tax papers reviewed by the Internal Revenue Department, and I might add this, that they have now gone back to 1950 on the depletion allowance, on hauling and development, and they are now penalizing us by quite excessive penalties from 1950, 1951, and 1952, and yet this is the first time we have ever had an interpretation.

The CHAIRMAN. That is the present administration?

Mr. MALEY. Yes, sir. And this is due to an opinion. There has never been a tax case on uranium yet, and most of the uranium miners are too poor to carry one very far.

We do have several problems just like this. Like I say, this is only one of many problems which we do have some work done on, and we think it is good constructive criticism.

The CHAIRMAN. We appreciate your appearance, and I also for the record agree with the senior Senator from Montana, that so far, to the mortification of some of us, we have made no changes in our free-trade balances to Europe and foreign countries.

Do you have anything further?

Mr. MALEY. No.

## STATEMENT OF M. G. MAGRATH, SUPERINTENDENT, SKIDMORE MINING CO.

Mr. MAGRATH. My name is M. G. Magrath. I am superintendent of the Skidmore Mining Co., and a professional engineer. I have 17 years, experience in the uranium industry of the Colorado Plateau.

I don't have a prepared speech, but I would like to open these things for discussion.

One of the things I would like to point out and define is the purchase schedule on uranium, the purchase schedule on carnotite ores in particular. I have presented a paper once at the Colorado Mining Association meeting in Denver, and this is not a criticism of the buying schedule, but more of a definition and the effects that it can have.

The study of mining costs of various carnotite mines, excluding the special ones with very large deposits, such as the Steen mine and the Happy Jack mine and the Monument No. 2 mine of the VCA, but taking the average small producer, they fall in a range of cost from about $27 to $32 per ton, cost of production. Their typical ores will average about 0.20 to 0.25 $U_3O_8$, and approximately 2 percent $V_2O_5$. The purchase schedules for this type of ore result in a return to the producer of approximately $30 per ton.

Now, the result of the cost of production and the payment very nearly meeting at this point, forced the producer to mine higher grade ores, which is fine in that it gets higher grade ores to the mill, milling costs are cheaper, but it places a penalty on him for low-grade ores, and he

shouldn't attempt to mine low-grade ores, and that in a way restricts production. But production of ores could be increased with increased prices.

The CHAIRMAN. Let me ask you at that point, what happens to these low-grade ores that are passed up as you go on through because of the present special specifications?

Mr. MAGRATH. By sorting, some of them are left in the mine waste dumps. Other parts of the ore are left as mine pillars, and then again there may be deposits that may not be economical to work and they are left intact.

The CHAIRMAN. Are they lost to any future production?

Mr. MAGRATH. I should say a portion of them are lost. They are not totally lost.

The CHAIRMAN. If they lowered the specifications at any time, could you then go back and mine all this low-grade ore?

Mr. MAGRATH. No, I don't believe all of it could be recovered.

The CHAIRMAN. I framed the question badly. Can you mine it when it is all real low grade, or when it is below .1 of 1 percent?

Mr. MAGRATH. That could be extracted completely.

The CHAIRMAN. Could you do it on a paying basis? It has always been my experience and observation in any mine, when you pass up the low-grade ore and backfill, and perhaps timbers rot and are displaced, that it costs so much to go back and get the low-grade ore it is never mined, it is lost.

Mr. MAGRATH. It is not a physical impossibility, but it is a price.

The CHAIRMAN. It costs more to go back and get it than it would as you go along. Most of it is lost.

Mr. MAGRATH. It is lost to all effect, yes.

The CHAIRMAN. You are talking about depletion allowance, but I have heard no recommendation of what the depletion allowance should be instead of the 15 percent.

Mr. MAGRATH. In my opinion I would say a 27½-depletion allowance similar to oil, providing it is specific as to uranium.

The CHAIRMAN. Yes. You know you have been on the verge of losing what you have, and the oil depletion allowance has been attacked continuously.

Do you have any further statement?

Mr. BOYLE. Would you mention again that the increase in the depletion won't be enough, there must be another, the phrase "50 percent of the net income"?

Mr. MALEY. The 50 percent limitation is what is having a very serious effect. In other words, uranium mining isn't quite as profitable as some people would like to believe, and in order to even appreciate the 15 percent depletion allowance on the gross values you have to make a net profit of 30 percent, due to the 50 percent limitation.

In my experience in the past 4 years, I believe I have only had one that ever made over 30 percent.

A good example is, if you mine $100,000 worth of uranium and vanadium, and at a cost of $70,000, which would be very low, you would then appreciate the $15,000 worth of depletion. But if you put out $90,000 for that $100,000 worth of ore, due to the 50 percent limitation you would only be entitled to use $5,000, and that is the bad feature However, it should be increased to at least 27½ percent, and should be on gross, and not subject to this.

Mr. BOYLE. That is the point.

The CHAIRMAN. One of you testified that lower grades should be accepted. What do you think the minimum grade should be that should be accepted and paid for?

Mr. HALDANE. I recommended in this particular paragraph, .05. That is 1 pound per ton of ore.

The CHAIRMAN. The way it is now, as I understand you, when you send a truckful of ore, or a carload, or any amount, and it grades just under 0.10, then they take the ore and dump it in with the rest of their milling operations, but you get no pay for it?

Mr. HALDANE. That is correct.

The CHAIRMAN. In other words, it is just given to the mill.

Mr. HALDANE. Yes. I believe in that particular instance the 0.10 was satisfactory, and I note the 10 to 1 ratio on ores existing at the Government purchasing depots is based on the acceptance of roscoelite type of ores at the purchasing depots. Roscoelite type of ores are ores with a high vanadium content and low uranium content, type of ore, averaging in the neighborhood of 0.08.

My feeling is this is a uranium industry, that we have to sacrifice something some place to get maximum production and put ourselves in a position approaching self-sufficiency in regards to uranium ore. If we must sacrifice anything, let's sacrifice the vanadium and stockpile or hold in reserve, in case of national emergency, some of these low-grade ores, because we would utilize them in time of national emergency, and undoubtedly the cost would be in excess of what it is now.

The CHAIRMAN. Do you have further testimony among your associates?

Mr. HALDANE. I think Mr. Magrath has another statement.

Mr. MAGRATH. I want to finish what I was leading up to in this price schedule.

The results of the price schedule are apparent now, in that the tonnages being produced today are gradually increasing in grade. I think the overall Plateau average is coming up above 0.25 percent $U_3O_8$. Now, that thing will stabilize, depending on what price is paid for uranium. If the prices were increased for uranium and lower grades could be mined profitably there would be an increase in production, but it would be at a cost that would make it more expensive for the mills to treat lower-grade ores. It would mean that the miner would be paid more for his uranium. It is one method of arriving at increased production. It is just simply incentive, is all. But it is at a cost to the Government to purchase the low-grade ores, so that there is no criticism of the present price except that it matches exactly costs.

Now then, there has been testimony and statements made that acceptance of low-grade ore would materially increase the amount of uranium materials available over a period of time.

Mr. MAGRATH. Providing that it is purchased at a price that made it profitable to mine.

The CHAIRMAN. Of course. Do you have any further testimony?

Mr. HALDANE. Mr. McNichols.

Mr. MAGRATH. There again in the case of specifications for ores purchased, among those being ores containing high lime, being discriminated here against, with penalties against the lime, or not accepted at

all in case it is too high, the high lime ores were originally most detrimental to vanadium processing, and it was a real harmful element in vanadium ores. They do affect, in some processes, to some extent, uranium extraction, but the chief trouble caused by lime in processing is that it consumes reagents. So there again it is a matter of reimbursing the mill. Ores could be accepted and at the schedules used, providing the mills were reimbursed for the reagents.

The CHAIRMAN. That would increase the available uranium ores?

Mr. MAGRATH. That would increase the aavilable uranium ores, in that those ores would have the same value as the lower lime ore, lower lime ores.

The CHAIRMAN. You mean it is not as harmful in uranium ores as it is in vanadium, and when the primary objective is vanadium ores there should be a penalty, but when the primary objective is uranium ores there should be some method of accepting the high-lime content ore?

Mr. MAGRATH. And then reimbursing the milling company for the extra expense due to the lime.

I believe that is all.

The CHAIRMAN. Mr. McNichols, do you have a statement to make?

## STATEMENT OF STEPHEN McNICHOLS, STATE SENATOR, COLORADO

Mr. MCNICHOLS. My name is Stephen McNichols.

The CHAIRMAN. You are a State senator?

Mr. MCNICHOLS. I am a State Senator from Colorado.

I represent the Uranium Ore Producers Association, and I think for the record it ought to be pointed out that this association has somewhere around 350 members. In addition to that they have a group of associate members who are businessmen and people located in this plateau area who depend on this uranium industry for a large part of their income and who are interested in the overall program.

The CHAIRMAN. In that connection this business is opening up some new areas that are developing economically that had very little development before?

Mr. MCNICHOLS. It certainly is. It has been the backbone of this whole country, due to the depressed prices on other minerals. It has been a godsend to this whole country.

The CHAIRMAN. And in your opinion it is an aid, a definite aid in maintaining our economic structure in this area?

Mr. MCNICHOLS. It is a very important aid, one of the most important aids.

The CHAIRMAN. That testimony coming from you as State senator is very important.

Mr. MCNICHOLS. I would like to point out to the committee that we, of course, are here by invitation, and we don't want to appear ill-advised or ignorant if we appear to criticize some of the policies of the Commission. There is nothing personal about these criticisms that we make, and I don't believe that either Jesse Johnson or Sheldon Wimpfen here believe that anybody is beyond criticism. We have never had anything but the finest treatment from Sheldon Wimpfen and Jesse Johnson at any time that we went to them. They have always been courteous and decent to us. We have taken occasion to

differ from some of the policies in effect, and we have tried to support our position the best way we knew how, and in some instances it might appear that there is a bad feeling and some friction and there really isn't.

We realize that the Congress of the United States wants to increase the production, as does the AEC, and we feel we can make some important contributions toward that increase in production, and we think we can make some suggestions to decrease the overall cost of this program.

The CHAIRMAN. I want to say to you at this point, that whenever the time arrives that a citizen cannot criticize Congress or any Commission, it will be close to the fatal moment. Any statements here are not considered as being criticisms of the Commission or Congress. It is merely things they haven't even thought of, and we are here to gather such information. I know that Senator Murray will join me in that statement.

Mr. MCNICHOLS. Before I left Denver Senator Ed Johnson, our senior Senator from Denver, called and asked me if I would like to appear here as his representative. He said he couldn't come. I told him I thought it would be improper for anyone to fill his shoes.

The CHAIRMAN. We have a high regard for Senator Johnson.

Mr. MCNICHOLS. And he asked me to extend his regrets he couldn't be here. He has a minor illness.

The CHAIRMAN. Thank you.

### LEASING PROGRAM

Mr. MCNICHOLS. I think one of the most important things we would like to discuss and point out is this matter of the leasing program.

Now, some people have testified here that the present leasing program is a good one, and it is adequate and it is fair, and in all respects today it is doing the job. We rather believe that it isn't objective and it isn't fair, and it isn't doing the job, and I say this in a constructive manner and not a highly critical manner.

I think the Commission has done the very best it could, with an important problem that came upon them in a hurry, and they had to get uranium and had to get it fast, and they went out and did the job.

Now the time has come when some of these things can be reevaluated. I wouldn't say we are right at that point, but I think it ought to be soon, that there is some revision of that leasing program.

Under the present system the Government withdraws land. I understand they have around 154 square miles of area withdrawn, and have restricted some 54 square miles. I believe that is correct. I don't know, the Government will go in and drill out an area, and to a certain extent delineate ore bodies, and when they have that done, of course there is information available as to how big the ore body is, and generally what it is worth. It may be worth $1 million or $100,000, but generally there is some value to it.

This is Government domain, it is public property, it belongs to us all. They are administering it for us. They have to select somebody to go in and mine it.

We have the feeling when the AEC is given the absolute discrimination, given the absolute say so as to who will get that lease. In other

words, they can hand it to A, B, C or D. Now, they have certain standards, and I think they try to follow them. They say a person must be financially qualified. He must have enough money to develop that ore body in an amount sufficient, or to develop that ore body at least to what is sufficient in their opinion, and I imagine it is rather realistic. They say that a man to be a likely prospect must have a certain amount of mining experience behind him, or have people associated with him who do have such experience. Then they gather all those lessees up, who happen to be qualified to handle that particular piece of ground. Now, this is my understanding of it. I may not be right. I think this is rather substantially its method, that it gathers all those lessees up, and says, "Now we have got to decide on whom we are going to give it to," and they pick somebody out. Obviously everybody they leave out are unhappy. They have some two or three hundred applications on file at the present time, and I think they have issued somewhere around 30 leases.

I may be wrong on that, but I think that approximates the rate correctly, and I think it is a rather small number of leases to have allocated with the amount of money they have spent, and the amount of drilling they have done. I would think they should have a much larger number to have allocated at this time. But I am not familiar with the circumstances, and can't be critical of the circumstances on that score.

But I feel this, there ought to be some policy and some set way whereby these leases could be allocated, so that everybody will be given fair and decent treatment, regardless of whether it is a big outfit or little outfit, regardless of where you come from, if you have got the experience and got the capital behind you. And it isn't difficult to get the capital if you have an ore body worth $800,000.

You can run down to almost any bank and they will finance your payrolls until you get to the ore body. Most anybody can get the money with that kind of setup. It isn't difficult.

### SUGGESTS LOTTERY

We proposed to the Commission through a number of discussions, and they were pleasant discussions, I might say, that they take all people who are qualified, even under their old system. I think it is rather a rigid system myself. I think the financial qualifications are often too high, and some of the other things, but I am a lawyer, not a miner. But anyway, I think they should take everybody who is qualified and who can pass, and then put their names in a hat and draw them out. Then everybody is satisfied. At least a guy has had a run for his money. There is no criticism of the Government that favoritism is being practiced, or that leases are being given to people on any kind of a basis other than an equal basis.

That system was proposed by Senator Ed Johnson. He calls it the lottery system. He thought it was fair, and we thought it was fair.

The Commission did tell us sometime ago that they would put a new system into effect last May. Up to date no new system has ever been put into effect. Maybe they feel that this system is the only system, and that they are going to insist that it be enforced, and if

they do, of course, I suppose that is it, because there is no appeal. You can't go anywhere from here, because under this law the Commission has pretty broad powers. So that is one thing.

LAND WITHDRAWAL

Now, the other thing that I think might bear some study is this matter of withdrawal of public land. I think there are a number of areas that have been withdrawn by the Commission, that today if private industry could go in and develop those areas they would go in and develop them with their own capital, and drill them without the Government ever having put a drill on them.

I think that the number of withdrawals that are made, certainly every time there is a withdrawal, I think there ought to be a commensurate restoral of land, or a commensurate amount of land leased out. I think it is inconceivable that the Government or anybody else can drill out the amount of land that is withdrawn. That is my opinion.

I have gathered that from the people who have been responsible for the USGS and AEC drilling programs. I have talked with them, and they have advised me that is substantially correct.

The CHAIRMAN. I might say for your information, there are a number of us in Congress who are considerably agitated about the amount of land the Government holds, and its apparent disposition to acquire more land.

There may be a bill show up one of these days to let them pay taxes in the States and counties, just the same as anybody else, and it might dampen some of their enthusiasm.

Mr. MCNICHOLS. I think they have a perfect right to withdraw land, and under certain circumstances it is a very desirable thing, if they would go into areas that private capital wouldn't develop, and develop those areas. I think that is a very legitimate thing.

Certainly they have to do an amount of drilling for geological purposes. Everybody agrees they have to do that, because they are concerned with the overall uranium picture, while the private producer is interested in a particular property.

The CHAIRMAN. Do they not, in some instances, come in and conduct an investigation on land owned by private individuals?

Mr. MCNICHOLS. You mean do they come into land owned by private individuals?

The CHAIRMAN. Yes.

Mr. MCNICHOLS. Yes, they do extensive drilling, and that has been something that has been subject to criticism. I don't say they are not due for criticism when they drill on 1,000-foot centers for 1 party and 75-foot centers for another. When people in the plateau area can see half a dozen Government drills up working on somebody's land, it is something that isn't accepted with too much favor by those that aren't getting the drilling.

It is the same with a lease. The guy who has got the lease, he is very happy with the leasing setup, because he has got a good thing. He doesn't criticize the thing. Of course he isn't going to criticize it. The people who have got the leases are happy, but the others aren't.

It seems to me there would be no criticism on a fair system. I think if the Government would restrict the amount of drilling it does, and I think its drilling is more costly than anybody else's. Everything the Government does costs more money than what private industry can do it for. That is just axiomatic.

I have worked with the Government myself. I think rather than having the Government and the AEC out doing this expensive drilling, if there were a policy with the DMEA or some existing Government agency where they would liberalize the loans to individual producers, they would get the drilling done at about one-fifth the cost, and the individual producer would be getting the benefit of it. More people would be getting the benefit of Government drilling. Government aid would be spread over a wide area, and the Government could then recover the cost of drilling if the operation was successful, like they do under the DMEA program.

I believe it has gone up from 10 to 25 percent. It is now $25.75 instead of $20.90, but the Government has got a chance to recoup its money.

The CHAIRMAN. Would you explain those unit prices for the record?

Mr. MCNICHOLS. As I understand now, formerly the DMEA would loan 90 percent on a loan, and then would be paid back at a rate not to exceed 5 percent from production. If there was no production and it was unsuccessful, you don't pay anything back. If it was you pay the Government back. Now I think they participate to the rate of 75–75.

The CHAIRMAN. That is good.

Mr. MCNICHOLS. It seems to me it is a more businesslike procedure where the Government is given a chance to get back some of its money and more people are given a chance to produce the stuff and make a living out of it.

Mr. MAGRATH. I would like to point out, it is a matter of record that the United States Bureau of Mines conducted the type of thing Mr. McNichols is talking about in the year 1942 or 1943. The statistics show on the pillar drilling and in drilling near workings, such as a miner-producer requires, and he did do with DMEA, that some 50,000 feet of drilling resulted in 50,000 tons of vanadium ore, which in turn would mean it is carnotite ore, and a commercial ore. It might give some idea of the return on drilling loans, that they are not wildcat as soon as they are put out.

### PRODUCERS SHOULD BE REPRESENTED

Mr. MCNICHOLS. We are making these as suggestions. That is in high level matters the Commission is concerned with, we don't presume to usurp the functions of this Commission at all. But we believe there ought to be some place in the policymaking committee of the Commission, there ought to be some place where the representatives of producers in this new industry could sit down with the policymaking authorities and discuss these matters on a high-level basis, and the Uranium Ore Producers Association has made an offer to the Atomic Energy Commission to sit down and go into these matters of cost. We represent people where you have large operations and small operations. We would be perfectly happy to go in on a cost-accounting basis and provide them with records and information.

The CHAIRMAN. Mr. McNichols, I think your accountant has offered to submit to the committee some definite recommendations, and you being a lawyer, and you have made some very intelligent suggestions—I am not entirely familiar, as chairman of the committee, with the problem, and I do not suppose that at the moment any member of the comittee is familiar—but if you will take your time and make 1 or 2 or 3 recommendations, with proper explanations, and submit it to the committee within the next week or 10 days, and just mail it to the chairman at the Senate Office Building, we would be very happy to have your suggestions.

As you point out, even the committee will be very careful in any recommendations it may make to the Senate, because we do realize that this is a new business and it must be handled very carefully until it is on its feet.

But in all the testimony received here in the past 2 days we have been in session, I for one am pretty well sold on the idea that if we keep pace with the industry and correct the mistakes as they become apparent, we can improve the conditions. I think myself that the AEC did a remarkable job in the production of material that was entirely unknown.

Mr. MCNICHOLS. I think that is correct.

The CHAIRMAN. That was unknown as a commercial product only a few short years ago. But I am certain, knowing the Chairman of the Commission, Mr. Straus, as I do, that he will be amenable to any practical suggestions that can be worked out.

So if you will submit your suggestions, then we can get right down to bedrock, and the members of the committee can discuss the problem among themselves.

Mr. MCNICHOLS. I would like to advise the chairman and the Senator from Montana, when the President was in Denver recently on his vacation, he invited me to discuss the matter with him, and suggested I do just what you are saying, insofar as advising Mr. Straus of our position, and some of the suggestions we had, and I did that, and they have that information, and we proceeded to go back there and discuss it with them, as well as members of this board of directors.

We had quite a lengthy meeting with Commissioner Murray and Mr. Straus was very acceptable to this, and Jesse Johnson has these things in mind, and I think with their permission we could provide you with a copy of what we submitted, although it is substantially the same thing.

The CHAIRMAN. Senator Murray makes a suggestion you just mail us a copy and it be made a part of your testimony, and if you want to supplement it with any further information we will be glad to receive it. I want to say there isn't any hurry in doing that, if you can get it to us in the next 3 weeks. We won't be able to make a report for some time.

Mr. MCNICHOLS. On this matter of depletion we have done some important work, and we are ready to send you some material setting out some special needs, together with what changes should be made in the Internal Revenue Code, and we would like to submit it to you, also to Senator Millikin, who said he would be glad to receive it. We would like to send you the same thing we sent them.

(Suggested amendments not furnished at the time the hearings were printed. When received, will be made a part of the committee files.)

The CHAIRMAN. Why don't you send it? You have grown up with this problem. Colorado and Utah are the two chief producers. If you have any recommendations, with regard to tax recommendations, and with regard to the Security and Exchange Commission regulations, send them in. You are no doubt working with the Commission at all times.

Mr. MCNICHOLS. We are trying to register a mining company with the Securities and Exchange Commission. There are as many roadblocks as you get in any type of registration, because there seems to be a more critical eye put upon a mining company, which often hampers getting registration for legitimate mining enterprises.

The CHAIRMAN. We are familiar with some of the objections. As a matter of fact, my committee in 1947 and 1948 had extensive hearings, and I have a bill introduced now amending the SEC Act. It has been my personal opinion for a long time to never give responsibility to any national commission to determine the feasibility of an enterprise before you can sell stock in an enterprise. It would be impossible for them to do that anyway. They do not have the engineers capable of making such a decision. As a matter of fact, no engineer is capable of making such a decision, because it is a venture industry.

Now what I do believe, and I am only speaking for one member of the committee now, what Congress meant by any regulatory legislation, was that when a seller of stock said he is going to do a certain thing, that if he did not do that there should be a penalty, but if he does what he says he is going to do with the money when he sells you the stock, and you understand it, that that is the honesty of the transaction.

Mr. MCNICHOLS. I always felt that the function of the Securities and Exchange Commission was to reveal the situation, not to cripple people. It was to advise people, and then they would decide whether they wanted to do it or whether they did not.

The CHAIRMAN. If they will do that.

Mr. MCNICHOLS. Senator, there is one other thing.

The CHAIRMAN. Any recommendations you may have in that regard, I will appreciate it.

Mr. MCNICHOLS. One other thing I would like to mention, and that is the question of multiple use. This association spent 2 years developing material that went into Congress bill 250.

The CHAIRMAN. We appreciate it very much.

Mr. MCNICHOLS. I recently understood that the Secretary of the Interior had formed a committee to pursue that matter of multiple use, on which committee there was the appointment of mostly people connected with the oil industry.

I recently talked this matter over in Denver, as a matter of fact with the Under Secretary in charge of minerals, and he suggested that we make certain suggestions along those lines, which I did, requesting that mining people, perhaps agricultural men, cattlemen, should also serve on that committee, rather than maybe just oil people. Certainly there are people like Mr. Palmer and Ray Holbrook of the American Bar Association, who could make valuable contributions to that committee, that I think should serve on that with the oil people, in order that the mining industries may be protected as well as the oil industry.

The CHAIRMAN. I think it would be well to get your recommendation in that regard.

If I may say one thing, speaking as one member of the committee, it has always disturbed me greatly, long before I was a Member of the Senate that Government officials assume they are going to have perpetual ownership of the Government lands. In other words, from now on we are going to regulate 87 percent of the area of Nevada from Washington, and whatever percent of Utah that they now own. They are no longer holding these lands in trust for the State and trying to formulate legislation under which they can be transferred to the taxpayers in units, family units or otherwise, but it is the policy that there is perpetual ownership, that all the people of the United States own them, and must profit by them. I have spoken many times in that regard. I am only one Member of the Senate, but I would like to see policies adopted that would point toward ownership on the tax roll. That is what the States need.

If you will just include that suggestion in your recommendations, we will appreciate it.

Do you have anything further?

Mr. HALDANE. I think that is all.

The CHAIRMAN. We thank you very kindly, and Mr. Haldane in the future if you have any suggestions to make that we can include in our hearings, will you address the chairman, at the Senate Office Building.

Unfortunately the Governor of the State, J. Bracken Lee, is not in the State, and for my money he is one of the best governors in the United States of America. We are calling Mr. Miles Romney, because he is authorized to represent the Governor.

## FURTHER STATEMENT OF MILES ROMNEY

Mr. ROMNEY. I realize time is fleeting. I regret very much our Governor could not attend your sessions and express his views on free enterprise, particularly as we have discussed free enterprise and the incentive system in relation to this problem.

Governor Lee is very much interested and has been very active in promoting the interests of mining in the State. He has been very pleased with the growth and development of the uranium mining industry in the State in recent years. Just a week or so ago he attended the Governors' conference in Albuquerque, and along with 11 other Governors of the Western States took a very strong position for the protection and development of the mining industry generally throughout the United States.

I am sure he will ascribe wholeheartedly to the objectives of this committee and be interested in the information which is developed, and which I intend to report to him.

I regret again he couldn't be here, because I feel he would have made a very valuable addition.

The CHAIRMAN. Thank you, Mr. Romney, and if you will convey our respects to the Governor, I will appreciate it.

We have Mr. P. H. Mulcahy, Mr. Callaghan of the Bureau of Mines, and John Garcia.

Now, Mr. Mulcahy, any statement you would like to make for the benefit of the record, we would apreciate it. Would you identify yourself please.

## STATEMENT BY P. H. MULCAHY, CHAIRMAN, UTAH STATE LAND BOARD

Mr. MULCAHY. I am P. H. Mulcahy. I am chairman of the Utah State Land Board.

### SECURITY AND STABILITY

Mr. Chairman, and Senator Murray, as a preface to a very short prepared statement, may I observe that the theme that seems to have been running through various meetings has been the encouragement and incentive to be offered to the prospector and private miner to develop minerals in the western part of the United States. It occurs to me that there is no better incentive that can be offered to them than a sense of security and stability, and the title to the land which they are developing and prospecting.

The situation has developed that these title are in a very chaotic condition, both through lack of surveys of grant lands by the Federal Government, and also by the alarming and multiplying public withdrawal of the public domain.

The State of Utah fully recognizes the paramount importance of proper controls of strategic minerals so as to provide for the maximum use and availability in our defense effort. These controls can be and should be imposed without further abridging the rights of the various land-grant States to the minerals in place underlying the school sections granted to the various States by the respective enabling acts before stability to prospectors and miners. Any legislation considered or recommended by this committee pursuant to Resolution 143 should embrace provisions to guarantee the above grants to the various States.

Upon admission of Utah into the Union on January 4, 1896, the State was granted sections 2, 16, 32, and 36 for the support of the common schools within its borders. Although the enabling act did not specifically so state, it was interpreted by the Supreme Court as granting to the States only those school sections in place which were not known to be mineral in character at the time of admission of said State into the Union or at the time of survey, whichever date occurred late (*United States* v. *Sweet*, 245 U. S. 563). In order to guarantee the mineral title to the land-grant States, the 69th Congress saw fit to enact into law chapter 57, United States Statutes at Large, approved January 25, 1927, which specifically provided that the grant made by the enabling act was to include numbered school sections mineral in character, unless said sections were within the limits of existing reservations created by the United States.

Since the passage and approval of the above 1927 law, the administrative branches of our Government through a series of apparently related procedures have endeavored and succeeded in preventing the title to the States' lands and minerals apparently contemplated in the enabling act from passing to the several States involved. This statement is well illustrated by the following actual example which is representative of many similar procedures. On April 15, 1930, or 3 years after the passage of the above referred to 1927 act, which act reaffirmed the State's title to the minerals and mineral lands granted to it at statehood, the President of the United States by Executive

order withdrew from lease or other disposal approximately 2,511,000 acres of public lands, termed in the order as oil shale lands. This action effectively prevented the title of the State of Utah from attaching to the land in question.

Subsequently in 1933 this original withdrawal was modified to permit the Secretary of the Interior to issue oil and gas leases under the General Leasing Act on the withdrawn land. The effect of this circumlocution was to prevent the Utah State title from attaching to the school sections in the withdrawn land, and despite the original grant at the time of statehood and the subsequent action of the Congress in 1927 kept the land, minerals, and consequent revenue therefrom in the hands of the Federal Government and diverted them from the support of common schools in Utah.

I might observe there is a substantial acreage in this 2½ million acres of withdrawn lands that is considered to be potential uranium land.

The 1927 act specifically referred to existing reservations, nevertheless, in spite of this congressional decree, by Executive order 3 years later 2½ million acres were withdrawn from the reach of the State's title and by subsequent modification of the withdrawal order were placed in the custody of the Interior Department with the power to lease, collect, and retain the revenues originally granted for the support of common schools in Utah.

The foregoing example is merely illustrative of one instance wherein by a withdrawal order and its modification the end result was the ultimate defeat of the intention of the original grant to public land States and the expressed intent of the 1927 enactment of the Congress. The records are replete with instances wherein the major accomplishment of withdrawal orders and their modification has been solely to defeat the attachment of the title of States to its grant land. Normally the title of the States attaches to grant land upon the completion and acceptance of the survey of such public lands, and there are instances where withdrawal orders have been placed upon lands as long as 33 years after the survey and consequent attaching of the title of the public land State.

It is earnestly urged that any recommendation of this committee and subsequent legislation toward the control of the production and use of strategic minerals shall also protect and guarantee to the public land States and their schools that which was granted to them in their respective enabling acts and subsequently affirmed by Congress in the 1927 act.

Now I might say further that we have many instances in the State of Utah where through the operation of a withdrawal order or a reservation both the State of Utah and the United States are issuing leases on identically the same land. Obviously that does not furnish any stability to the prospector and the independent miner. It merely leads them into a lawsuit.

The CHAIRMAN. You mean leases are now being granted, for example, for uranium production on some of these lands?

Mr. MULCAHY. Subject to the reservation contained in the Atomic Energy Act; yes.

The CHAIRMAN. Mr. Mulcahy, we thank you very much for your appearance here, and this subject is very important to the public land

States, and we appreciate your appearance and the submission of your statement.

Now Mr. Callaghan represents the Bureau of Mines of the State of Utah, and then Mr. Garcia.

## STATEMENT OF JOHN GARCIA, STATE MINE INSPECTOR, NEW MEXICO

Mr. GARCIA. He represents the State Bureau of Mines from the State of New Mexico, and I am the State mine inspector.

The CHAIRMAN. You are Mr. Garcia, and you represent the——

Mr. GARCIA. I am mine inspector.

The CHAIRMAN. Will you proceed in your own way? You have heard the evidence for 2 days, and you know the objectives of the committee. Will you just in your own way submit whatever information you think will be helpful?

Mr. GARCIA. My name is John Garcia. I am State mine inspector for the State of New Mexico.

The CHAIRMAN. You also represent the Governor of New Mexico?

Mr. GARCIA. As a matter of fact he asked Dr. Callaghan to express his regrets, he had other commitments, and he couldn't appear.

Our department deals with the safety and collects a great deal of statistics for the State of New Mexico. I am not familiar with the problems that face the uranium producer from the standpoint of production. However, in talking to some of our small miners in the Grants area, they asked me to bring the following to the attention of this committee, which I shall read:

It is the consensus of opinion of the majority of small uranium producers in New Mexico that the system of determining bonus eligibility be changed to increase production of uranium.

Circular 6 states that the bonus plan is for the purpose of encouraging and assisting the development of new sources of domestic uranium production in the interest of the common defense and security. The bonus plan has gone far in accomplishing this purpose, but that certain modifications of the plan would make it much more effective and practical.

As it now stands, certification of a property for bonus is based on various tests which, in effect, are so indefinite that many certifications have to be treated as special cases and decided upon by the AEC on a basis of precedent and policy.

The effect of this situation is that an operator who is planning to open a new property often does not know whether his property will be eligible for bonus or not. Although bonus eligibility is often the deciding factor in determining whether it is economically feasible to open a new property. A decision by the AEC is usually not made until after the property is in production.

Most bonus certifications are now decided on a basis of ownership. This basis, in the opinion of many producers presents serious inequities. For example, if 2 outcrops 2,000 feet apart were on fee land owned by 1 person, the 2 outcrops would qualify for only 1 bonus. If these same outcrops were on separate parcels of fee land which were owned by different persons, the outcrops would probably be eligible for 2 bonuses. If these same 2 outcrops were on Federal land, and were staked by 1 person under contiguous claims, the 2 outcrops would be eligible for only a single bonus. However, if the outcrops were staked separately, they would probably be certified for separate bonuses. Of course persons now staking claims make sure their claims or groups of claims are staked in such a manner as to allow for maximum number of certifications. But the unfortunate person with fee land or claims staked prior to the advent of the bonus system has no opportunity to divide his properties into a maximum number of bonus groups.

As a possible remedy it has been suggested that the AEC establish an arbitrary linear distance between producing mines as the principle basis for determining bonus eligibility.

The production bonus is a very important factor in the economics of uranium mining and is invaluable as a stimulus for exploration. Any clarification of Circular 6 and any modifications of Circular 6 to remedy its inequities would be helpful to the uranium industry.

A number of uranium producers wanted me to bring this matter to the attention of this committee. Also these producers want to make it very clear that their relationship with the AEC has been satisfactory in every respect. Remarks are offered as suggestions and not criticisms.

I may add this Senator, that New Mexico is coming to the front in the production of uranium. At the present time we have 35 mining companies that are under the jurisdiction of the State that are now in operation, and with the completion of the Anaconda mill at Bluewater, and the vast tonnages that have been blocked off, an increase in the production of uranium is anticipated. How large that increase will be I can't tell you, because of the restriction of production information, or rather information has been restricted by the AEC on production.

At the present time, I may add that we have a surplus of miners in the State of New Mexico as a result of our lead-zinc shutdowns. As a matter of fact that figure stands at 1,265 men at the moment, and in addition we have a lot of our Navahos that make excellent miners with very little training.

The CHAIRMAN. Thank you, Mr. Garcia. We appreciate your appearance here. If you have any further information to offer the committee, just address the chairman at the Senate Office Building, and I hope you will inform your Governor we are according him the same privilege, and that we are counting on him.

Mr. GARCIA. O. K.

## STATEMENT OF EUGENE CALLAGHAN, DIRECTOR, NEW MEXICO BUREAU OF MINES AND MINERAL RESOURCES

The CHAIRMAN. Now, Mr. Callaghan, you also represent the State, and the bureau of mines. Would you identify yourself for the record?

Mr. CALLAGHAN. Mr. Chairman, my name is Eugene Callaghan, director of the New Mexico Bureau of Mines and Mineral Resources, a State agency.

I am here also as a result of your invitation to Governor Mechem to represent the State of New Mexico in these hearings.

The resources of uranium, as they have so far been found in New Mexico, of course, are very well known to the Atomic Energy Commission, and that information is not available to me as a State agency, so I cannot report on exact tonnage or grade or the amount or what to be expected.

I would like, however, to show you this map of the State upon which are spotted many occurrences of uranium minerals showing that it is widely distributed in the State, and that in addition to the areas at Grants and in the Laguna Indian Reservation, and in the vicinity of Shiprock where actual operations are under way now, there are very good indications that more uranium deposits will be found in New Mexico.

The CHAIRMAN. Would you like to submit this map as exhibit No. 1 in your testimony?

Mr. CALLAGHAN. I would be very happy to.

The CHAIRMAN. It will be accepted, and filed with the committee.

Mr. CALLAGHAN. The Jurassic rocks, which have been so prolific in their content of uranium, occur almost throughout northern New Mexico, but not in the southern part of the State, so that there is plenty of rock to prospect. Also the Cretaceous formations have been found to contain uranium as well, so we can, I believe, look forward to increased production from New Mexico.

I think we can say that the deposits which have been found in the vicinity of Grants, N. Mex., and in the Laguna Indian Reservation are very important. There are 2 types of deposit there, (1) is in a thin 15 to 25 feet bed of limestone, which has very considerable linear extent, and in which the first discovery of uranium ores in this area was made. Considerable tonnages of ore were blocked out, all of these available by open-pit operations, and a mill was designed and has been constructed at Bluewater to handle these limestone ores.

Later prospecting was extended into the standstones both above and below this limestone bed in the Jurassic, and even larger bodies of ore were found in the sandstone. All of these are available to open-pit operation. Some are being uncovered now; the overburden is being stripped.

A mill to handle the sandstone type of ores is also necessary in this area, and I understand that arrangements are being made for its construction. That is in the Grants area, to take care of the ore in the Grants region and the Laguna Indian Reservation.

In addition to that, of course, are the ores on the border between Arizona and New Mexico, near the Four Corners. All of this is a part of the Colorado Plateau area, but the New Mexico situation is somewhat different from the usual condition in the Colorado area, or in Utah and Wyoming. Even the mineralogy is different, though I cannot report to you on all of the minerals that occur in this area. I understand they are under investigation by Professor Gruener of the University of Minnesota for the Atomic Energy Commission. But there are some very interesting new minerals showing up in this region.

As I understand it, this area is under the jurisdiction of Grand Junction, the Atomic Energy Commission there, with a suboffice in Grants.

The CHAIRMAN. At Grants, N. Mex.

Mr. CALLAGHAN. Yes, for the rest of the State outside of the Plateau area, the other occurrences of uranium, I understand, are under the direction of the Denver office of the Commission with a suboffice at Albuquerque.

As a State agency, we make no attempt to evaluate or determine uranium resources, as we feel that is a Federal function for which very large sums of money are appropriated, and we feel that the State moneys, such as they are, for mineral resource investigation, can be better expended on other resources, so that any details and information, which I am sure are available in the Atomic Energy Commission, and any questions regarding them, should be referred to that agency.

There is something about the land ownership which was just mentioned by the previous speaker. In this region, of course, there is a diversity of ownership of land. Most of these deposits are actually

within sight of the Santa Fe Railroad, and for those lands which are not directly Indian lands, the Santa Fe Railroad owns the odd-numbered sections, not only the surface, but the mineral rights as well.

That, interestingly enough, has put the Santa Fe Railroad in the mining business, and they have gone into it with great gusto and are a major shipper of uranium ore to the mill at Bluewater.

The limestone ores of the Santa Fe lands, and on some lands which do not belong to the Santa Fe Railroad, vary greatly in the grade of ore. And by careful selective mining and blending of ores to a certain grade, they are able, by the fact there are some high-grade spots, too, to make a product that will be acceptable to the mill.

In addition to the railroad lands, of course, there are the Indian lands, not only those within our actual reservations themselves, but the allotted lands. There is also public domain in this area, and other fee lands, and also State land, which has been in the newspapers to a considerable extent lately, and I have here a letter from the State land commissioner from which I may quote a paragraph.

This is dated November 10, 1953, and he says:

> We have adopted the policy that uranium deposits in place in New Mexico should be classified as lode, or location in place, and not as placer. This determination was made after careful investigation by members of my staff, and on the basis of expert advice furnished me.

The State lands are allotted to the various institutions and schools of the State, and the State land commissioner is responsible for their proper maintenance and utilization, and the income from those lands is allotted to the institutions and the schools which hold that particular piece of land.

So this ruling of the land commissioner, which was upheld by the court, which decided that he would have discretion in the matter of how the land was to be disposed of, sets the way in which any State lands involved in any uranium exploration can be handled in that office.

I think that is all.

The CHAIRMAN. We thank you very much, Mr. Callaghan, and you convey our best regards to the Governor of New Mexico, and if you or the Governor has any further information for the Commission, will you please mail it to the chairman at the Senate Office Building.

Mr. E. G. Frawley has left a statement with the committee. Will you identify yourself for the benefit of the record and just read the statement as a part of Mr. Frawley's testimony as if he were present, or say what you want.

## STATEMENT OF C. ALLEN ELGGREN, SECRETARY-TREASURER AND DIRECTOR OF CONSOLIDATED URANIUM MINES, INC.

Mr. ELGGREN. My name is C. Allen Elggren. I am secretary and treasurer and director of the Consolidated Uranium Mines, Inc. Mr. Frawley, who is president, is somewhat under the weather, and for that reason has not appeared.

This prepared statement I think is self-explanatory, and I think it reemphasizes most of the points which have been brought up here.

I think there is one additional recommendation which we would like to make under his No. 1, which was the elimination of the $35,000

bonus under circular 6 for the first 10,000 pounds of uranium produced, and in lieu thereof increase the development allowance of 50 cents per pound to some higher figure which would more nearly be consistent with the cost exploring for and developing further uranium. In this connection a greater sum would be provided for exploration and development, and of course, instead of going into the operator's pocket, as the bonus now does, an increased development allowance would go into the ground for an expansion of reserves. The operator, just the same as he is doing now with the 50 cents per pound allowance, should be required to substantiate the expenditures to the Atomic Energy Commission, or either be refused the bonus or allowance, or be compelled to repay the Commission.

The other recommendations, I think are in line with what have been emphasized, particulary with respect to tax, depletion allowance, and the present tax setup for writeoff purposes on machinery and other equipment, in order to make it possible to recoup the investment which is put into exploring and finding new deposits.

I think that is the extent of what we would like to submit at this time.

(The following statement was submitted by Mr. C. Allen Elggren on behalf of Mr. E. G. Frawley:)

STATEMENT BY E. G. FRAWLEY

I respectfully beg leave to make the following statements to the committee with respect to matters which, in my opinion, could contribute to the expansion of uranium ore production on the Colorado Plateau.

My name is E. G. Frawley, of Salt Lake City, Utah, and I am president and director of Consolidated Uranium Mines, Inc.

In my opinion one of the most important things to be done to promote increased uranium ore production on the plateau is a program which includes as its main objective the exploration for, development and production of lower grade uranium ores than can now be produced under the present price schedules and other conditions now existing. It seems to me that private industry, under the right circumstances and conditions, which the Government could assist in providing, as hereinafter set forth, could be attracted to undertake such a program. The program would involve considerable research to increase efficiency in exploration, including drilling at reduced costs, as well as improved techniques for underground development, and the improvement of mining methods, and, of course, an intensive program of metallurgical research to find methods or processes for upgrading low-grade ores in the field, with plants which would not involve the huge expenditures required to build such plants as are now operating.

If such a program could be carried through, which I believe is reasonably probable, these small and relatively inexpensive field plants could furnish the existing processing mills with concentrates which would have the effect of providing more pounds of uranium and at the same time enable the present processing mills to handle and treat considerably more pounds per month than they are now doing, because of the increased uranium content of the production which they would be handling from field upgrading plants.

I believe that private industry would take advantage of the opportunity to initiate and carry through such a program if the Government could find it consistently possible to revise certain schedules of the Atomic Energy Commission and amend certain laws, as follows:

1. Eliminate the $35,000 bonus, under Circular No. 6, for the first 10,000 pounds of uranium produced, and, in lieu thereof, increase the development allowance from 50 cents per pound to some higher figure which would more nearly be consistent with the cost of exploring for and developing a pound of uranium. In this connection, a greater sum would be provided for exploration and development, and, of course, instead of going into the operator's pocket as the bonus now does, the increased development allowance would go into the ground for an expansion of reserves. The operator, just the same as he has to

do now with the 50 cents per pound allowance, should be required to substantiate the expenditures to the Atomic Energy Commission or either be refused the bonus or allowance or be compelled to repay it to the Commission.

2. Make provision, in connection with the upgrading plants, for an allowance per ton for milling the ore, which initially, at least, would probably be required to offset the cost of research for processes to upgrade the lower grade ores, the construction of plants, and to provide a cushion against metallurgical losses. In this connection, the Atomic Energy Commission would have the authority to pass upon the feasibility of any such program, including the construction of such upgrading plants, and in this way the Government would not be required to pay out funds for any of the purposes stated except to qualified operators, who would be required to meet certain standards. Here again, it would be possible for the Atomic Energy Commission to adopt and publish the fundamental requirements in connection with any such program, with certain discretionary powers in the Commission to make changes to meet such special conditions.

3. Amend the income-tax laws to provide a greater depletion allowance than now exists with respect to uranium mining, and provide a period of from 1 to 3 years for new companies during which they can be partially tax free, somewhat the same as Canada and Mexico, provided that the profits during that period are used in exploration and development and not for the distribution of dividends. Under the present tax setup it is virtually impossible for a new company to accumulate substantial capital for expansion, from production, and no doubt the Government would not only assist in the expansion of uranium production with such a provision but, in the long run over a period of years would probably obtain considerably more taxes from substantial concerns than it could possibly do by destroying the initiative to go into the uranium business or, once having gone into it, to expand it.

The CHAIRMAN. Thank you very much, and will you please express our regrets to Mr. Frawley that he is not able to appear, and thank him for his statement.

Mr. ELGGREN. Thank you, and we appreciate the opportunity.

## STATEMENT BY H. BYRON MOCK, REGIONAL DIRECTOR, BUREAU OF LAND MANAGEMENT OF COLORADO AND UTAH

The CHAIRMAN. Mr. H. Byron Mock. He is regional director of the Bureau of Land Management of Colorado and Utah. He may have some statement of the relationship between the oil and gas leases and the locators under the 1872 Mining Act.

Will you identify yourself for the record, Mr. Mock?

Mr. MOCK. Senator Malone, I am Byron Mock, the regional administrator for Colorado and Utah for the Bureau of Land Management.

It is in this area that the majority of the problems involving the oil and gas leases and mining claims have arisen. The problem as we have viewed it is the problem of letting the miner on lands that may prove to be uranium ground. We have worked closely with the Atomic Energy Commission to go as far as we can in clearing up that confusion.

It may very well be in many cases the uranium miner may go out and discover uranium, help to develop the raw materials, and in the end wind up out in the cold because he is confused about the title, and someone else is smarter than he in tracing that title. This could get the uranium development for the AEC, but it would not take care of the prospector who had sunk everything he had into trying to develop ore. That situation ought to be cured.

I think we are all concerned with the overall production of atomic energy materials, and our job in the Bureau of Land Management is to make available any lands that are available for that purpose. But in

doing so the man who is the backbone of exploration, the prospector, and in most cases the small miner, may do all his work with no return to him, if we don't recognize the problem and face it directly.

Now on this question of title, or the right to develop areas, first of all in determining whether a mining claim is put down on public land that is open to location, in this country here we must remember that we have numerous withdrawals of land. Lands withdrawn by the Federal Government from mining locations includes numerous types of withdrawals, and they go back further than any of us can remember. They reserve lands for power sites, for dam sites. There have been the oil shale withdrawals. There have been park withdrawals. In some cases there have been municipal watershed withdrawals, although they don't come into the picture particularly. And in addition to that there have been entries on the land under other public laws which constitute public withdrawals from mining locations, for example, the oil and gas leases and other mineral leases under the act of 1920.

These records are kept by the Federal Government because they deal with Federal property in the Bureau of Land Management at its offices in the State of Utah or the State of Colorado, as the case may be. They are not correlated, and maps are not put out that would show the status at a glance or at least identify the property.

### CONFUSION OF TITLE

Despite the confusion of title, or the limitations on access to records that exist, we have found that many people in good faith—and that was the occasion for Public Law 250, people trying to develop uranium, filing mining claims on oil and gas leases—people in good faith have gone out and done their best to develop the minerals. They have been relatively successful in cases, and then have found there was a confusion as to whether they actually owned it or someone else did.

In order to meet that problem we have done the following things in conjunction with the AEC, and in some cases they have done other things, and in some cases we have gone beyond. We have first of all tried to find out what mining claims existed on the public lands in the counties where the activity is the greatest. We have microfilmed mining claims.

We began in San Juan, Emery, and Carbon Counties. Those microfilms are being carded in our regional office. In addition to that we have made a complete study of the available information, and haven't stopped on it yet, to find what withdrawals have been made in Colorado and Utah that will limit the access to the minerals. That has been done in cooperation with the Atomic Energy Commission.

We have put out maps that would show those withdrawals. There may be mining claims that are filed when a withdrawal shows on the books, and then the withdrawal was lifted, and at that time, under the established practices in the courts and in administrative tribunals, the mining claim has to be filed again, or another person could jump it, because it becomes newly opened up. That is a problem that has not generally been recognized.

We have told what withdrawals have been in existence at various times, so that the availability of the public lands for mineral development can be identified as of that moment.

Now, carrying it further, besides the withdrawal maps and the microfilm and our records, we have found it necessary to bring those together and correlate them, in order to find out what the status of the land is, and we have found it necessary to analyze the existence of oil-and-gas leases on the lands, and incidentally an application for an oil-and-gas lease withdraws the lands, under established practices, as well as if a lease had been issued. The practice has been in existence for 30 years, and whether it should have been that way in the beginning, that is the way it has been, and it has created an additional element of confusion.

Now, in order to meet this problem, we are not recommending that there be a recordation statute on the public land claims. We think bringing this information together from the sources where it is now officially filed and making it available to the man who is trying to develop that area, will do as much as any other thing to eliminate one element of speculation in development of lands by the small miners of this country.

I think there is need for bringing up this matter, and bringing up to date the information on these public lands, and there ought to be an affirmative program under the structure of the present laws to make that information available so that the people who need to know their rights can get them identified.

SUGGESTS PROGRESS

I think that we have gone about as far at present as it has been possible to do under the cooperative program of the AEC and BLM in order to get that information out, but from some of the statements that have been made and some of the questions that have been raised with us, we think that it is highly desirable to identify that property so that people will know that it is not only the finding of the ground, but also protecting themselves on the title that needs to be investigated. The BLM in its program is not responsible for encouraging uranium development, or dealing with the matter of extraction, but merely for attempting to eliminate one of the major obstacles that now exists in the case of our public land resource.

That was the extent of my statement.

The CHAIRMAN. Thank you very much for your testimony. Have you heard, or do you have any opinion as to how this new law 250 that we passed early in the session is working out, following the hearings and recommendations by this committee?

Mr. MOCK. On the one hand, it is a little early for us to tell. I don't believe the time has run out yet for the final filings of those claims under the provisions of the new act.

The CHAIRMAN. Yes, it has.

Mr. MOCK. We haven't gotten the results of it.

The CHAIRMAN. No, the time has not run out for the final filing, to hold the claims. The time limit is to January 1, 1953, for the original filing. Now they have to serve notice.

Mr. MOCK. As soon as that law was passed and as soon as we could we drafted a letter to all of the people whom we knew had had claims filed, and knew of about eight hundred who were in conflict with oil-and-gas leases. We sent them a copy of the law, and we pointed out

to them the necessity of studying the law and seeing how it applied to them. We sent that to the local newspapers, and we asked each person who received that, that they might pass that information on.

We had no information in our office that gave us a complete list, even the microfilm records.

The CHAIRMAN. Mr. Ray Sullivan is present and had some information to offer the committee. Time is running short, but we want everyone to be heard who wants to be heard, and Mr. Sullivan is here.

Mr. Sullivan, will you identify yourself for the record? You can always file a supplemental brief.

## STATEMENT OF R. G. SULLIVAN, VICE PRESIDENT, MINERALS ENGINEERING CO., AND DIRECTOR, SALT LAKE TUNGSTEN CO.

Mr. SULLIVAN. My name is R. G. Sullivan. I am vice president of the Minerals Engineering Co., and director of the Salt Lake Tungsten Co.

All of my remarks today are more pertinent to the mineral, or the metal tungsten, than they are to uranium.

We are 1 of 2 companies who built and just recently completed a tungsten refinery in the Salt Lake area. As you know, the Purchasing Act of 1951 was passed for tungsten. The purchase of tungsten was for a period of 5 years of 3 million units. The act has been extended, during the last week of Congress, from 1956, July 1 of that year.

The CHAIRMAN. This committee was instrumental in extending the act.

Mr. SULLIVAN. Yes, to July 1 of 1958.

The CHAIRMAN. That is right.

Mr. SULLIVAN. And that has been a great stimulus to this industry.

The CHAIRMAN. Many of us believe, however, those special acts, such as the act I introduced and that this committee recommended to the Senate be passed and was passed, would be unnecessary if the regulation of foreign trade would just revert to the Congress where it belonged, through the Tariff Commission. We do not consider that they are very solid in the production of any material, when they are fully dependent upon the extension of some law ever so often by Congress. They might fail to do it and your investment is gone.

Mr. SULLIVAN. As of January 1 of this year we were told that some 230,000 units of the 3-million-unit goal had been purchased, and we noticed the other day published figures, 360,000 units in round figures.

This goal is still not going to be obtained, that is, this goal of 3 million units in the 5 years or less that now are left in this period through 1958, unless the small miner, small-mill operator, has some access for obtaining money for products that do not meet the specifications as now published in the schedule, but which can be upgraded to meet specifications.

What I am getting at is there are many mines, many mills in the West—Nevada, Idaho, Montana, Utah, Colorado—who are producing tungsten, and who have products representing considerable amounts of money to them which do not qualify to the specifications as now published. This plant that we built in Salt Lake, and 1 or 2 in the

West, they can upgrade these products to meet Government specifications, but we are a private industry, and we do not have funds that we can finance these mines and mills during the interim period, the time of delivery to us, the time of delivery to the General Services, to that these miners can stay alive. That period might take as much as 60 or 90 days.

During the war, I am sure you are familiar with the setup as it was operated under the Metals Reserve where we had a plant here in Salt Lake City set up to buy low-grade materials, ores or concentrates, that did not meet these specifications, and this plant upgraded the material so that it met the industry's requirements.

That particular setup was the greatest stimulus for the western part of the United States in the production of tungsten in this part of the country.

You have Mr. Jesse Johnson sitting over here, who is now with the Atomic Energy Commission. You remember that program and that it was eminently successful during the war.

It was successful in that the small miner could get his money for his product within 10 or 12 days from the time of making delivery. We feel, and what I am trying to tell you today is, that this same arrangement should be made for the small miner today, the man who does not have the means or facilities to upgrade his ore so it is acceptable under GSA standards. That man should still be able to obtain his percentage of money for his product and stay alive and be in operation.

The CHAIRMAN. Let me ask you, are you familiar with the fact in 1934 Congress abrogated its duties in regard to foreign trade and delegated that power to the President and said, "You make treaties with foreign nations in trade and industry"? Are you familiar with the fact it has been extended every 3 years, and until 1951, when some of us were able to cut it to 2 years, and this year we extended it another year, to June 1954?

Mr. SULLIVAN. Oh, no.

The CHAIRMAN. And therefore the State Department has already made trades with foreign nations and has traded the tungsten industry down the river. Are you familiar with the fact that if it goes back to the Tariff Commission, an agent of Congress, automatically, so that they would then set that tariff on the basis of the Constitution of the United States, on the basis of a fair and reasonable price, it would take the profit out of that low-cost competitive labor?

Mr. SULLIVAN. Yes.

The CHAIRMAN. If you are so familiar, are you for the extension of that act or its expiration?

Mr. SULLIVAN. We are for its expiration.

The CHAIRMAN. Then I think that is where your work should be directed, if you are dependent on these bills and the continuation of your business depends upon influencing some committee to pass legislation for you to stay in business. Either small or large operations will not ultimately be successful without favorable conditions.

I don't know whether you know of these bills, but the chairman of this committee tried to get an extension for 2 years on the purchase of tungsten, manganese, chromite, and some other materials. Congress was undecided. They little understood the problem to start with. They were pushed and pulled around on national and international problems, so it was not a big problem as far as Congress was concerned.

Some of us that understood it finally substituted the Malone bill for the bill passed by the House, passed it in the Senate, and sent it over there and watched it very closely.

I want to give you something about legislative procedure. If they had not taken the Malone bill, we would have immediately passed the House bill, which only included tungsten, and sent it over there, and it would have been up to the President who could have refused to sign it after we adjourned.

If you knew what a chance you took on getting any extension at all, and if you had not gotten it, making all your investment worthless, then I think you would put some time in on the real subject, that is to let Congress resume its responsibility of regulating foreign trade and foreign commerce, and to adjust the duties, imposts, and excises as the Constitution says they must. It is article I, section 8, in case you haven't read it for some time. That will relieve us of the necessity of trying to save your life about every 2 years.

Let Congress establish the principles again of regulating foreign trade, and if all of you folks would just study this thing and help us a little bit, we might start the ball rolling again.

I think you are riding for the greatest fall you have ever had in the mining industry.

Mr. SULLIVAN. We are not asking for any new bill. We are asking for the present bill in effect today. We believe that GSA has authority to advance money on tungsten purchases.

The CHAIRMAN. GSA has contracts for foreign ores and domestic ores. I think you are hanging on a very tender hook. I think you had better get on the ball.

Mr. SULLIVAN. We agree with the principle.

The CHAIRMAN. I appreciate your appearance, and if you have anything further you would like to submit, send it to the chairman, Senate Office Building.

I would like to call Mr. Jesse Johnson for a few minutes.

Mr. Johnson, while you will be available to us in Washington, I want you to understand, Mr. Johnson, we do depend on your advice to a large extent, and you will be called officially or unofficially. Since you have offered your testimony, several points have been brought up, one that you should accept low-grade ore, and another one that there should be a renegotiation clause in the contract for the mills, and then the high lime content of ore. There has been considerable discussion around those three points. Could you cover them very quickly, and at least sum up the testimony?

## FURTHER STATEMENT OF JESSE JOHNSON

Mr. JOHNSON. Mr. Chairman, with regard to accepting low-grade ores and making a price arrangement that would bring out low-grade ores, that is a matter that we have had under study, and I have asked our people from Grand Junction, since the testimony was given before this committee, to reexamine the problem very carefully.

I think, as I mentioned during my testimony, we have been looking at very low-grade materials, much lower grade materials than the producers are talking of here. However, it is true when one gets down to very low-grade materials there must be large tonnages, and there

must be a treatment plant near the ore, in most cases, in order to produce a product at an economic price.

The question will be examined, and we will be in touch with you as to that, Mr. Chairman.

The CHAIRMAN. Thank you.

Mr. JOHNSON. The question of the renegotiation clause in milling contracts is one that I believe that most private companies do not like. I am sure that Mr. Steen, if he decides to build a mill, would not like a renegotiation clause.

I do not like the principle of having a company penalized in its profits for efficiency, increasing recovery, and lowering costs. I believe there should be that incentive.

As for mills that might get into trouble because of the price, we have attempted to work the problem out, and I think it will be successful.

### PUBLIC LAND WITHDRAWALS

The CHAIRMAN. Thank you. Now on the public-land withdrawals, do you have any advice to offer in that connection? You have heard testimony that withdrawals of land in certain cases hampered investment of private capital and development.

Mr. JOHNSON. I know that our experience over the last 5 years has been that our land-withdrawal programs have been to the benefit of private industry, as well as to the program. I believe that most of the producers, large and small, in the Colorado Plateau area will agree.

When we started the program in 1948 very few private companies, had ever gone back on the mesas from the outcrops and drilled. The chances were long, the geological information scanty, and the methods of operating had not been perfected to the extent that they are today.

I can't give you the exact mesa, but I recall one case where there had been production of uraniunm and vanadium ores off and on over a period of 40 years. Production had been by gophering from the outcrop and it had amounted to only a few thousand tons in all.

There was a large area that had not been drilled. Before drilling we withdrew the area from mining location, but all locations that had been made prior to the withdrawal were not affected.

We drilled, pattern drilled, across the mesa. We drilled on private lands as well as the public lands. We made no distinction in our preliminary geologic drilling. This drilling developed 300,000 tons of ore, and I think one-third of that tonnage was on private lands.

I submit that as a general example, but my figures may not be exact. We have followed that practice for the last several years.

In the original program we had a policy set up to make restorations of equal size to the new withdrawals.

When the Korean war came on in 1950 we had to increase production rapidly, we had to expand our drilling. We increased that drilling program from 100,000 to 200,000 feet a year to about 1 million. That program includes the United States Geological Survey's work, as well as our own.

Before making a restoration we must survey the areas on which ore has been found. And consequently our program of restoration has been slow. I think that the policy of withdrawal for the purposes mentioned is a desirable one in the program. I think we should keep

our total withdrawals to the lowest limit possible, and to make restorations as fast as we can, and should improve the rate of restoration, if possible.

The CHAIRMAN. You do restore the withdrawal lands just as fast as you can following the completion of your program?

Mr. JOHNSON. That is correct, retaining the ore deposits that have been found for lease to private operators.

### LAND ALLOCATION

The CHAIRMAN. Now, some criticism has been developed as to your method of allocating the lands to lessees after the Atomic Energy Commission had proven that ore existed.

What method do you follow of selecting the parties to which you will lease these lands after they are proven lands?

Mr. JOHNSON. I think Senator McNichols' statement is essentially correct. We have a list of applications giving the qualifications of the applicants. When the leases are available, they are given to applicants on the basis of qualifications to operate efficiently the particular leases.

The CHAIRMAN. It is an arbitrary selection?

Mr. JOHNSON. It is a selection, based on qualifications.

Now, the standard practice in Government is to lease on the basis of competitive bidding. I don't think that is desirable for the leases under discussion, although we are aware of criticism by following the practice that we do. I think even the UOPA does not want to go into competitive bidding.

The system might be improved and is under study. It is difficult. As you have heard testimony today, some of the producers feel our present system is about as good as you can get. There are objections to a lottery system. I don't know what the perfect system is.

The CHAIRMAN. There is probably no perfect system.

### BONUS SYSTEM

Now you have heard the bonus referred to, and this is the last question I intend to ask. You have no doubt had all these things under consideration. What do you have to say as to the criticism of the bonus?

Mr. JOHNSON. I think the bonus system is reasonably effective in carrying out the purposes we have in mind and giving assistance. We may be able to, and I have asked some of the people about it yesterday before the meeting, try to improve our administrative policies in such a way as to eliminate, if possible, the uncertainties that were brought out by the State mine inspector from New Mexico.

The CHAIRMAN. Well, Mr. Johnson, I appreciate very much your making a special trip to Salt Lake City, and I want you to thank your superiors for us. Your testimony has been very clear and enlightening. I find a surprising approval of your methods. Even if sometimes you are forced to do some things they do not think are correct, they seem to like you personnally, and I think that is a very great tribute to you.

I now want to thank all of the witnesses and all of the people who have made an appearance here before this committee at this hearing.

I am sure that the material we have gathered is going to be very helpful to the committee in determining whether or not any further legislation is necessary for coordination of the working of the Federal laws in the efficient development and production of uranium ore.

I know that the committee will appreciate the information it has received pointing to the self-sufficiency of the production of this important material in the United States and Canada, and in adjacent areas, especially in the Western Hemisphere.

There was one statement you made that you needed all the uranium ore that could possibly be produced in the future, both here and abroad. I am sure you mean, Mr. Johnson, under present conditions, and with present information.

Mr. JOHNSON. Yes, sir; and I thought I made it clear that I was speaking of the period of time for which requirements have been established.

In speaking of the future, I certainly did not want to encompass any period that would run beyond a relatively short period of time.

The CHAIRMAN. I was sure of that, Mr. Johnson, and thank you.

Again I would like to thank all of you for the cooperation you have given us in appearing at this hearing, and I think that the information you have given us will be of great value to the committee.

The committee will now stand in recess.

(By direction of the chairman, the following statement is made a part of the record:)

STATEMENT OF MITCHELL MELICH SUBMITTED TO THE MINERALS, MATERIALS AND FUELS ECONOMIC SUBCOMMITTEE IN SALT LAKE CITY, UTAH, NOVEMBER 12 AND 13, 1953

My name is Mitchell Melich, and I am a practicing attorney in Grand Junction, Colo., and have been actively associated with many mining companies that are producing uranium. Like most attorneys in Grand Junction, Colo., I have been instrumental in forming and representing new companies that are entering the uranium mining industry. I am a partner in three mining companies which are now producing and shipping ore to the mills or buying stations. One of these mines is near Edgemont, S. Dak., and the other two are close to Gateway, Colo. One of these partnerships, called Ameo Mining Co., has an exploration team in the field using an aircraft with the latest scintillation equipment. This team was successful in locating some of the recently discovered anomlies, or deposits, in the Riverton area of Wyoming. Beyond my personal interest in the uranium industry, like other attorneys in the Colorado Plateau area, I represent a portion of the other mining companies in the business.

It is my understanding that this hearing is being held with the intention of gathering testimony which may be helpful in recommending policies that could help increase the production of vitally needed uranium. There are many persons more qualified than I to recommend improvements in the access-road problem, the tax structure in regard to depletion and income, the high line penalty, the withdrawal procedure, the defense minerals exploration loans and the granting of Government leases on property previously explored by the Government drilling programs. The Colorado Plateau uranium committee of the Colorado Mining Association felt that it might be well, if those of us representing that organization at this hearing, limit ourselves to the discussion of one major problem or recommendation each. Because of my particular training I would like to bring to the attention of this subcommittee the still remaining problem of the much needed multiple use of Government lands.

Briefly, this is how the problem arose. Section 5B7 of the Atomic Energy Act, passed by the 79th Congress, declared that all uranium, thorium, and other materials peculiarly essential to the production of fissionable material was thereby reserved for the use of the United States. This particular section has never been clarified as to its meaning and the legislative history surrounding the passage of the act is not too clear or helpful. During the summer of 1952 it came to the attention of the Atomic Energy Commission, from several sources,

that a good many of the claims staked on the Colorado Plateau for uranium were on property which had previously been impressed with an oil and gas lease from the Government to private industry. The Defense Minerals Exploration Administration, being aware of the 1924 land decision invalidating all mining claims on land impressed with an oil and gas lease, began denying financial help to the companies whose property was then in doubt as far as title was concerned. The Atomic Energy Commission was also concerned with these claims which were apparently invalid. Such a claim was not eligible for the bonus payments from the Commission. In order to forestall any decrease in production from these properties the Atomic Energy Commission wisely began leasing these properties to the persons that had staked the claims over the oil and gas lease property. The lessees were then able to apply and receive the bonus and any information available from Government drilling was released to the claim holder. This stopgap measure was successful and production was not seriously impaired.

It is estimated that two-thirds of the Colorado Plateau is now impressed with applications or actual oil and gas leases. As you all know, Public Law 250, S. 1397, prescribed a method whereby a person that had located uranium claims on oil and gas property could validate those claims provided he had staked the claims between July 31, 1939, and January 1, 1953. In order to validate these claims the locator must, prior to December 10, 1953, post an amended location on the property and file an amended location notice with the proper county. Apparently, if the locator does not take this action, his claim, after December 10, 1953, will be void.

Since January 1, 1953, many claims have been staked on the Colorado Plateau on property which has been previously covered by an oil and gas lease. The area known as the Big Indian Wash, near Mr. Charles Steen's mine, has had many claims staked since the first of this year. I think it is safe to say that a very large majority of these claims are in the following predicament. There is no present law or regulation which will permit these claims to be validated for the bonus payment from the Atomic Energy Commission or to be recognized by the Defense Minerals Exploration Administration for purposes of loans for exploration. Furthermore, if the Government locates ore on these properties with their drilling programs there is no provision whereby this information can be released to the locator of the claims, nor is there, as yet, any policy for leasing this property in order to get into production. I recently was forced to advise a large company in the industry that they would not be safe in purchasing a block of these claims because they would have no assurance whatever of obtaining title or the exclusive right to mine this property. Furthermore, the company would have no assurance of being eligible for the bonus or for an exploration loan from the Defense Minerals Exploration Administration.

I believe that the foregoing adequately illustrates the problem that this uncertainty of title to uranium property presents to the industry as a whole. It is at this time restraining the development and mining of a large number of claims and, in some cases, entire areas. There are those that would advocate a Government leasing program on these uranium claims similar to the oil and gas plan. Others, and among these we find many of the uranium mining people, would advocate further legislation to validate all uranium claims that have been properly located on public lands. Being closely associated with the mining industry I believe that this plan would meet with the most favor among uranium mining people. One supporting reason is the fact that a good share of the entire Colorado Plateau has been located at a considerable expense to the persons in the industry. To invalidate all of that work and to ignore the expense involved would be criticized by many of the companies and individuals in the business.

It is the thought by the Colorado Plateau uranium committee of the Colorado Mining Association that this problem requires immediate attention. If greater production is to be achieved in the near future it is our recommendation that this problem be solved in some manner at the earliest possible date.

We want to thank this committee for the opportunity of appearing here and if there is anything further that the Colorado Plateau uranium committee of the Colorado Mining Association can do to be of service to you, or to the industry, we will be pleased to do so.

(Whereupon, at 4:50 p. m., November 13, 1953, the instant hearing was recessed subject to the call of the Chair.)

# STOCKPILE AND ACCESSIBILITY OF STRATEGIC AND CRITICAL MATERIALS TO THE UNITED STATES IN TIME OF WAR

## Uranium

FRIDAY, FEBRUARY 26, 1954

UNITED STATES SENATE,
SPECIAL SUBCOMMITTEE ON MINERALS,
MATERIALS AND FUELS ECONOMICS OF THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D. C.*

The subcommittee met at 10 a. m., pursuant to call, in room 155, Senate Office Building, Washington, D. C., Senator George W. Malone (chairman of the subcommittee) presiding.

Present: Senator George W. Malone, Nevada (presiding).

Present also: Jerome S. Adlerman, subcommittee counsel, and George B. Holderer, subcommittee staff engineer.

Senator MALONE. The subcommittee will be in order.

The hearing today was called primarily on the metal columbium, which is a very scarce, strategic metal, but we will take the first few minutes to hear Mr. Vernon Pick, a producer of uranium.

This committee held 2 days of hearings in Salt Lake City last summer on the production of uranium, to determine principally how to change the 1920 Oil and Gas Leasing Act, to dovetail or operate in conjunction with the 1872 Mining Act, in order to promote or allow the mining and production of uranium on an oil lease, with the oil lease, of course, having priority if first filed.

There were suggestions at that time that further modifications might be necessary. Mr. Pick also gave some very interesting testimony on the tax setup on uranium.

I am going to ask him to come forward this morning, and, if he will, make suggestions for further improvements in legislation on the mining of uranium on public lands. We would also like to have him tell us what might be done taxwise to further encourage the production of uranium.

Our imports come from the Belgian Congo in south Africa, but uranium was discovered some time ago on the Colorado River Plateau, which includes parts of Colorado and Utah. It has since been discovered in Wyoming, Idaho, and Nevada.

Of course, the more enthusiastic miners and prospectors believe that there are practically unlimited amounts if conditions can be improved so that a maximum amount of ore can be produced.

Of course, this subcommittee has heard witnesses, such as Gen. Albert Wedemeyer, Gen. Bonner Fellers, and General Johnson, under Mr.

Thomas, who is one of the chief lieutenants of Mr. Wilson, head of the National Defense Department, and the consensus of their testimony is that it will be impossible to transport such material across either major ocean when a fourth all-out world war starts.

Mr. Pick, I know you are anxious to return to your work in Colorado and Utah, but would you take a few minutes and outline any definite suggestions for legislation which you think might improve the uranium-mining situation, and also any tax changes you think may increase uranium production?

## STATEMENT OF VERNON J. PICK, GRAND JUNCTION, COLO.

Mr. PICK. My name is Vernon J. Pick. I live in Grand Junction, Colo. I am a uranium prospector and a miner operating and owning two mines on the Colorado Plateau in Utah.

During the past 3 years I have had a chance to observe and become acquainted with many of the operations on the plateau, as well as the men who direct them. During the past year particularly, I have seen the activities there increase at a great rate, and the number of discoveries of new ore bodies almost double in volume over the rate of the previous years.

From these recent events, it is quite apparent that the potential of this area has been barely scratched, and that we may expect a continuation of not only the activity but additional new discoveries, as well.

In the past I had thought that what has happened would be all that would be necessary to assure this country of all the uranium necessary for not only our military security, but for the peacetime uses as well. Even though I had heard representatives of the Atomic Energy Commission testify that this country needed all the uranium production possible for our security, and that we did not yet have anywhere near enough for that purpose, I assumed from what I could see that we would soon be able to produce enough.

However, in spite of the large number of new discoveries and our country's potential of production, production has not kept pace with the amount that has been discovered.

Senator MALONE. Why is that?

### WHY LIMITED PRODUCTION

Mr. PICK. The reason has been, as I see it, a tax problem entirely. A man may discover a uranium ore body and think that his troubles are all over then; but if he mines it at a rate that is called for by the need for uranium today, he finds himself being paid by the Government for this ore, and then in effect handing it all back to them in the form of taxes. Actually, it amounts to confiscation of the ore body if he mines it out at more than a very limited rate.

Senator MALONE. What do you mean by "mining it at a limited rate"?

Mr. PICK. I can give you my own case as an example. The ore body is very large. We do not even know the total extent of it yet, even though we have been drifting into it in various directions for a year and a half. If I mine it at the rate that I am now, I find myself

in the top tax bracket; and many people say, "I wish I had your troubles," which is true enough. The income is sufficient, I suppose, for anyone. However, if I mine it faster, the amount that I realize from it is very small in addition to what I have been able to take out up to this date.

I am not making myself very clear, I fear, but let me go on with this statement and then perhaps I can make it clearer.

Many miners in the area have had this problem, and they have done the same thing I have, some of them mining only, say, 3 months out of the year, others limiting their production but mining for a total of 12 months.

I feel that if this country needs uranium as badly as I have been told—and in talking to officials of the Atomic Energy Commission and trying to find out whether they really do need this ore as badly as I have understood, they have told me, "We are breathing right down your neck. We want it badly. We need it badly."

Senator MALONE. They want to become self-sufficient in production in this country or this hemisphere, is that it?

Mr. PICK. I feel sure that they do. Relying on foreign ore shipments for a part of our needs is hazardous in case of war, beacuse, I presume, those shipments would be cut off immediately war started, and in some way we must develop our own uranium ore to the point where we can be self-sufficient.

If this country needs uranium as badly as we think it does and as we have been told, there seems to be but one possible solution to this problem. Many years ago when the oil industry was new and struggling to develop the potential of this country, tax relief was given them in the form of a large depletion allowance. This had the effect of stimulating both exploration and production, and the results are a matter of record.

This type of encouragement, which has paid off so well in the creation of new taxable wealth, is a tribute to economic understanding, and if applied to the uranium industry it would produce similar results.

Senator MALONE. Are you speaking of the 27½ percent depletion allowed the oil industry?

Mr. PICK. Yes, in comparison to uranium, which receives only 15 percent. That would be a great help.

I might add, however, that a 27½ percent depletion, existing when the oil industry was new meant an almost complete elimination of taxes because the tax rate was then, in comparison to our present taxes, so low as to be practically nonexistent.

Today the depletion allowance would have to be made much higher, say 50 percent or more, to have the same effect as a much smaller one did years ago. In addition, the law limiting the maximum depletion to 50 percent of net would have to be removed to have very much effect.

Senator MALONE. I might say at this point that there have been many millions of dollars expended in my State of Nevada in the last 4, 5, or 6 years. For many years the geologists said there were no oil deposits in our State because of the volcanic formations that had been burned up, and all that sort of thing. However, they discovered

oil in the same formation in Utah, so then they moved over to our State. They tell me it requires anywhere from $150,000 to $400,000 to drill one of these wells. Naturally, you have quite a few dry holes along with one that may produce.

After several of these experiments in our State, about 2 weeks ago they hit oil. They say they have a 200-barrel-a-day well, and now it seems everybody is coming in and drilling. But without that depletion allowance, the chances are oil would never have been discovered in Nevada.

Of course, the argument has been made for 20 years that we are going to run out of oil, but every time we wake up in the morning we have a greater supply of oil. Do you think that is due to the tax concession?

Mr. PICK. I feel almost certain that it is. I have talked with a large number of people about the oil industry, many of whom are now becoming interested in the uranium industry, and they have felt that to take the oil dollars, as they call them, and put them into uranium might not be too good, simply because they had a larger depletion allowance than the uranium industry is offered.

Senator MALONE. Tell the committee just how this operates. I understood you to say that some were working only 3 months a year. Does that mean that your stockholders then would benefit less, percentagewise, if you operated longer and got into another bracket?

Mr. PICK. That is what it amounts to. Take the case of a large mine and compare it to a small one. A large mine is rather hard to shut down. In effect he is operating only 3 months out of the year by simply limiting his daily production to a very low rate.

Senator MALONE. Employing fewer miners, but a full year?

Mr. PICK. That is right. The owner who may have only a small ore body knows that it is limited, but in order to make it last as long as possible and stay out of the high tax brackets, he will probably operate that only a few months, 2 or 3 months out of the year, and spend his money the balance of the year. In that way he makes his mine last much longer.

Senator MALONE. As a matter of fact, the policy of a smaller depletion allowance in mining has had its effect on the production of other strategic metals and minerals, has it not?

Mr. PICK. I don't believe I quite understand the question, Senator?

Senator MALONE. In other words, the same principle applies to zinc and lead, which we are all worried about now, and tungsten and other minerals. That might be why they are still in the strategic and critical class.

Mr. PICK. From what I have heard of some of the other mining industry, particularly lead and zinc, and some others, something must be wrong with the tax setup, because they are unable to survive. Many of the mines have closed down in the area that I am in.

Senator MALONE. There are other contributing factors, such as the money we have spent in Africa and other places working up a little competition for ourselves. We have already gone into that in our hearings.

How would you remedy this situation? Have you any suggestions.

3 YEARS TAX FREE

Mr. PICK. One of the first ones that comes to mind is increasing the depletion allowance to 27½ percent instead of the 15 percent that is now allowed us. Twenty-seven and a half percent is what the oil companies get, and it has been very helpful in aiding them and enabling them to continue exploration and increase their production.

Then we could take the case of what I understand Canada does. Canada has been very conscious of mining and the value of it to her country. She gives each new mine 3 years tax free while they develop their property and get it into production. This would be very helpful.

Right now, when uranium is so badly needed, not 10 years from now or 5 years from now, but immediately, I think it would be a very good way of getting the maximum production now.

Senator MALONE. Do you think Canada's tax laws are responsible for making their dollar worth a little more on the market than ours today?

Mr. PICK. Not being too well acquainted with dollars and the reason they go up and down, it does sound, though, as though it might have something to do with it.

Senator MALONE. After talking to the men engaged in this business and in the supervision of the business, do you think we could become self-sufficient in the production of uranium within a reasonable time if favorable action on these suggestions were taken by the Congress of the United States?

Mr. PICK. From what I have seen in the last year in the Colorado Plateau, I am absolutely convinced that it has a great potential. I can't say whether we would be self-sufficient or not. I don't know how much is needed. That is something of a secret. Currently there is a great amount of it needed, and we have a great amount of it.

Senator MALONE. Is it not a fact that they have continually discovered deposits over a wider area in other States, beginning in Utah and Colorado?

Mr. PICK. Not only Utah, Colorado, Arizona, New Mexico, which are all part of the Colorado Plateau, but in Wyoming, Nevada, Dakotas, and I understand recently, New Jersey and Pennsylvania have minable deposits, or at least indications of that.

Senator MALONE. In other words if there is a profit in it, they find it.

Mr. PICK. That is right.

Senator MALONE. That applies to oil, zinc and lead, tungsten and all minerals that Mr. Ickes, former Secretary of the Interior, said we were running out of.

That is very interesting. If you do not have anything further to offer at this time, a copy of your testimony will be furnished you. This is an informal hearing. After further consultation with your fellow produces out there, you may correct your testimony or complete it in any way you see fit, for the use of the committee.

Mr. PICK. Thank you.

Senator MALONE. I mentioned the fact that this subcommittee had held hearings last year which resulted in a change or a modification

of the Oil and Gas Leasing Act, validating 1872 act mining claims located on such leases, I believe, until January 1, 1953, or December 31, 1952.

I have discussed this matter with you, and I gathered from your comments that there are many such claims, the status of which is not clear. Would you discuss that matter for a minute or two?

Mr. PICK. Yes. That is true. The claims that had been located on oil and gas leases which were found to be not valid claims were made a valid claim by, I think it was 250—is that the number of the law—which made all claims located previous to January 1, 1953, valid. However, due to the increased activity on the plateau, a great many more claims have been located since that time.

The Atomic Energy Commission has, I think they call it, Circular 7, which in effect gives them the power to withdraw these invalid claims that have uranium on them——

Senator MALONE. Withdraw the land on which they are located?

Mr. PICK. Yes, the land that these claims cover, that are on oil and gas leases—and then re-lease them back to the individual who staked them out. It sounds as though it ought to work, but because of the great activity on the plateau now, we are finding people staking one claim on top of another. In some places they are 4 or 5 deep. Then each one of them is hoping to take this to the AEC and claim it is theirs. Because the Atomic Energy Commission office at Grand Junction, which is taking care of this, does not have a court that can settle things of this sort and it must be handled by direction within their group, I think it is going to lead to a great deal of confusion. It is not the solution, although it is the best one they could have made at the time.

Senator MALONE. I think that matter was discussed before the committee when we held the hearings; that is that the Atomic Energy Commission could cause a withdrawal of the land and through leases to operators get around the fact that there was no way of patenting a mining claim, and therefore it was not a legal claim.

That was corrected by this act up to a certain date, and I know the committee will be very much interested in what you have to say. If you care to get more information, if you can, on the details of just what is happening there and return it to the committee in the same manner as your other testimony on taxes, we would appreciate it.

Mr. PICK. I would be glad to do that.

(The following material was submitted by Mr. Pick:)

MAJOR DOMESTIC SOURCE

I know I don't have to emphasize the urgency of the Atomic Energy Commission's uranium production program on the Colorado Plateau. I think most of you gentlemen know that this region of ours is the major domestic source of uranium. From a national defense point of view this is a great measure of security.

No one better than I, and independent miners like myself, recognize how very important it is to accelerate this production. I say this because, roughly, 50 percent of the uranium production from the Colorado Plateau has been, and will continue to be, mined by men like myself.

I want to stress this point from the outset. Unlike any other ore-producing region that I know of, this is a small miner's field. To better understand this let me briefly describe the nature of the uranium fields on the Colorado Plateau. The ore is not found in one district, but in many districts covering roughly 150,000 square miles in Colorado, Utah, Arizona, and New Mexico. The ore is scattered

in shallow pockets and lenses as well as in deeper channels. The deposits are small and vary in grade and chemical composition from one pocket to another within a matter of a hundred feet or less. The independent miner, or the contract miner for the mining companies, is the man who can best mine selectively and hand sort. Nevertheless, it is an important segment of our mining industry, it is growing, and there must come more men like me if the Atomic Energy Commission's demands must be met.

The strong pressure for more and more production is a demand which I cannot gage. I think that the steps taken by the Atomic Energy Commission in bringing the independent miner into the production picture was an intelligent solution to the problem of quickly getting ore out of the ground from as many faces as possible. I don't think, though, that any of us fully realized the tax problem facing the independent miner when pressure had to be applied for more tonnage per man shift.

I'm sure you gentlemen are familiar with the graduated personal income-tax scale. At $40 per ton mine value it doesn't take much tonnage to put you in a 70 to 90 percent tax bracket. The important point to recognize is that our chances of building up any capital for the further development of a field which has just been scratched just doesn't exist.

What about depletion, you say? Certainly, an increase in the uranium depletion allowance is something you should consider. But let me take my previous example of $40 a ton ore. Because of the nature of the ground, shortage of water, and sedimentary nature of the ore it is an expensive operation—$28 a ton mining cost is not unlikely. Under such conditions you could raise the depletion rate to 50 percent of the gross value of the ore, but the limitation of statutory depletion to 50 percent of the net makes such relief in this case meaningless. I still think an increase in the depletion rate is worth considering, but I don't think it is the whole answer for many of us.

In Canada, I understand, they grant a 3½-year tax moratorium on new mines, and thereafter the depletion is limited to one-third of the net. I think this type of tax relief is worth some consideration, but it doesn't unlock much of the ore which has been already discovered and developed.

### PROPOSES PLAN

I would like to propose a plan which embodies some of the concepts of both methods of tax relief.

It seems to me most important to recognize that the present taxation of the uranium producer, such as me, embodies some degree of capital levy. A complete moratorium, which would release a flood of ore and rapidly accelerate the flow of capital into small mine development, would also be like feeding a threshing dinner to a starving man, as far as the uranium concentration mills are concerned—they just couldn't digest it.

Therefore, I would suggest for your consideration, a uranium production tax exemption to be deducted from net income computed with the allowance for depletion over the next four years as follows:

| | *Percent* | | *Percent* |
|---|---|---|---|
| 1st year | 20 | 3d year | 60 |
| 2d year | 40 | 4th year | 80 |

This, gentlemen, would have the same effect as if you gradually increased the depletion allowance to the following rates:

| | *Percent* | | *Percent* |
|---|---|---|---|
| 1st year | 18 | 3d year | 24 |
| 2d year | 21 | 4th year | 27 |

This would give us some relief from the 50 percent of net limitation without a fundamental change in the present depletion statute.

I recommend this 4-year schedule because I think it will provide the incentive for accelerated mining without a serious danger of high grading. Conservation of as valuable a natural resource as uranium must be a consideration.

Such a uranium production exemption, over a 4-year period, would give the uranium mills the incentive and time to expand to be ready for a much higher feed. Without uranium concentrate such a tax reduction would not satisfy the real requirement—that of the national defense.

Senator MALONE. We look forward to your testimony. Thank you, Mr. Pick.

Mr. PICK. Thank you, Senator.

(By direction of the chairman, the following is made a part of the record:)

UNITED STATES ATOMIC ENERGY COMMISSION

Washington 25, D. C.

For release in afternoon newspapers, Wednesday, September 23, 1953.

URANIUM ORE PRICE AND INITIAL PRODUCTION BONUS SCHEDULES EXTENDED

The United States Atomic Energy Commission has extended the expiration date of the guaranteed minimum price schedule for uranium ores of the Colorado Plateau area, and also has extended the time during which initial production of uranium ore from new domestic mines will be eligible for bonus payments. The actions were taken for the purpose of continuing the Commission's program of encouraging the production of uranium from domestic sources.

The Commission's Domestic Uranium Program Circular 5, revised, has been extended to cover the period through March 31, 1962, from its previous expiration date of March 31, 1958. This circular, which went into effect on March 1, 1951, provides guaranteed minimum base prices for the uranium oxide content of carnotite-type and roscoelite-type ores of the Colorado Plateau area. The price schedule ranges from $1.50 to $3.50 per pound of uranium oxide content, depending upon the grade of the ore, together with certain allowances and premiums.

Domestic Uranium Program Circular 6, which established a bonus for initial and certain other production of uranium ores from domestic mines delivered under its terms between March 1, 1951, and February 28, 1954, now has been extended through February 28, 1957.

For eligible new mining properties, bonus payments are made on each pound of uranium oxide in acceptable ores delivered to qualified mills or Commission buying stations up to and including the first 10,000 pounds of uranium oxide. For eligible mining properties which produced less than 10,000 pounds of uranium oxide during the period from April 9, 1948, to March 1, 1951, bonus payments are made on the difference between 10,000 pounds of uranium oxide and the number of pounds sold between April 9, 1948, and March 1, 1951.

Bonus payments range from $1.50 to $3.50 per pound of uranium oxide in acceptable ores produced from eligible mining properties, depending on the grade of the ore. Thus, the maximum bonus which may be obtained from production of new mines ranges from $15,000 to $35,000, depending upon the grade of ore delivered.

Bonus payments are made directly by the Commission and not by the receiving station or mill, and are in addition to purchase payments made pursuant to ore buying schedules. Before bonus payments are made, the producer must make application to the Commission, and the Commission must certify that the mine is eligible for the bonus.

Copies of Circular 5, revised, and Circular 6 may be obtained from the Commission's Grand Junction Operations Office, Post Office Box 270, Grand Junction, Colo., or from other Division of Raw Materials' offices of the Commission.

(Whereupon, at 10:20 a. m., the hearing was recessed, subject to call.)

# COLUMBIUM, COBALT, AND RUTILE

# STOCKPILE AND ACCESSIBILITY OF STRATEGIC AND CRITICAL MATERIALS TO THE UNITED STATES IN TIME OF WAR

## Columbium, Cobalt, and Rutile

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FRIDAY, FEBRUARY 26, 1954

UNITED STATES SENATE,
SPECIAL SUBCOMMITTEE ON MINERALS,
MATERIALS, AND FUELS ECONOMICS OF THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D. C.*

The subcommittee met at 10:20 a. m., pursuant to call, in room 155, Senate Office Building, Washington, D. C., Senator George W. Malone (chairman of the subcommittee) presiding.

Present: Senator George W. Malone, Nevada.

Present also: Jerome S. Adlerman, subcommittee counsel, and George B. Holderer, subcommittee staff engineer.

Senator MALONE. The subcommittee will be in order, and we will proceed with our hearings on the status of the supply of columbium and cobalt.

We have many witnesses here this morning, witnesses who know the history, the production requirements, programs, and source of such materials. We have one man here who has been of inestimable assistance to the committee. This man is Chief of the Production and Resources Division of the Wright-Patterson Air Force Base, Dayton, Ohio.

I would like to call at this time Gen. Kern D. Metzger. If you will come forward, General.

### STATEMENT OF MAJ. GEN. KERN D. METZGER, CHIEF, PRODUCTION AND RESOURCES DIVISION, WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO

Senator MALONE. General, the subcommittee appreciates your assistance very much, and we are especially gratified to say that Dr. Flemming, of the Office of Defense Mobilization, announced at our last meeting that a Committee on Titanium had been appointed, with Dr. Herbert Kellogg, of Columbia University, chairman; Felix Wormser, Assistant Secretary of the Interior, as one member of the committee; and Gen. Kern D. Metzger as an adviser.

I presume, general, you have received your letter of appointment by now.

General METZGER. No, sir, I have not at the moment. It may be at the base. I have been away for about a week or 10 days.

Senator MALONE. At least we were assured by Dr. Kellogg that the letter had been written and was on the way. So I congratulate you on that appointment. I know it will mean a good deal of work. The committee will be interested in the progress of the work. I know that you will be very helpful to that committee.

Now regarding the metals columbium and cobalt. Knowing that your job at the airbase is to determine the use of these metals and to know the amount needed in the national-defense field for the Air Corps, we have asked you to come here this morning and in your own way give us the picture as you see it. I recall you were the first one who said we needed 160,000 tons a year of titanium at a time when we were producing 2,000, and it had taken 3 years to reach that amount. You said that we needed that amount so the planemakers and manufacturers could take the plans off the boards. Later that was verified, and even made to look conservative, by Don Douglas, or Douglas Aircraft, and Bob Gross, of Lockheed, and it resulted in the plans for the special committee I have just outlined.

I want you to know at the outset that the only interest of this subcommittee is to determine the needs, the sources, and what has to be done to become self-sufficient in this material in the United States and the Western Hemisphere.

## NECESSITY AND CONSERVATION OF CRITICAL MATERIALS

General METZGER. Senator Malone, I appreciate the privilege of appearing before your committee to discuss these vital problems, because critical materials such as you have on the agenda today are essential to the production of our modern combat aircraft.

We, with the jet age, learned immediately that high-temperature steels were essential to the production, life, and performance of the jet engines which we were incorporating into our modern combat aircraft.

The requirement for columbian, cobalt, nickel, tungsten, and chrome skyrocketed with the introduction of the jet engine, insofar as aircraft demand for those materials was concerned.

It became apparent early in the Korean buildup or prior to the Korean buildup that columbium, possibly cobalt, and to a certain extent nickel, could be limiting factors in our jet-engine production, quantitywise.

Senator MALONE. This is used in high-temperature steels?

General METZGER. High-temperature steels, in order to provide the strength under operating temperatures and in order to overcome oxidation.

We in the Air Force, becoming aware of the essentiality of these alloying metals—because they are alloying metals insofar as we are concerned—undertook every means possible to reduce our demand. We undertook strong conservation measures to the point of inserting in our contractual documents with our manufacturers of engines, builders of engines, that a certain content of columbium, cobalt, nickel, tungsten, and chrome per 1,000 pounds of thrust output of the engine would be accomplished——

Senator MALONE. Do I understand that to a certain extent they are substitutes for each other?

General METZGER. They are not substitutes for each other, but by varying degrees varying content in alloying, you may decrease the use of one and increase the use of another, or you may eliminate one or more altogether.

Senator MALONE. In a way, then, they are really replacements, one for the other, to a certain extent?

General METZGER. In part yes sir; to a certain extent.

Senator MALONE. I understand too that this new metal titanium is also a substitute or replacement to a certain extent.

General METZGER. Yes sir. Titanium will relieve the situation considerably with regard to columbium, cobalt, and nickel.

Senator MALONE. That, General, is one of the problems faced by engineers. This committee has already received what the chairman believes to be conclusive testimony that offshore areas across a major ocean will not be available should a fourth world war start. We are concerned with the supply of materials such as columbium. We are also interested then in the replacements and substitutes for such strategic materials.

That is where we feel your testimony is going to be very valuable.

General METZGER. In this conservation program that I have just mentioned, we were able to conserve very considerable quantities—or perhaps I had better put it that we were able to reduce our requirement of very considerable quantities of columbium, ferrocolumbium, and cobalt. We increased, however, in so doing, our requirement for nickel.

However, we feel that we have about reached the end of that conservation possibility in the present steels which we are using in jet engines.

At this point I must go back and repeat again the statement you have very appropriately made that titanium has relieved our requirement for high-temperature steels to a certain extent.

Senator MALONE. Because titanium itself has the strength necessary and the temperature requirement for certain uses?

General METZGER. For certain uses in the cold end of the compressor, the so-called cold end. It is still plenty hot.

Senator MALONE. What would be your requirements of columbium if you had all the columbium you needed; what would your requirements be if you could substitute these other metals for columbium?

General METZGER. At this time, based upon our current production program, there is sufficient columbium, sufficient cobalt, nickel, and chrome, to satisfy our program.

Senator MALONE. And titanium?

General METZGER. Not titanium.

Senator MALONE. You leave that out?

General METZGER. Leave that out, please—to satisfy our program.

There are no critical shortages reported by any of our engine builders at this time in support of the current production program. However, in this world situation we are not privileged to live on a day-to-day basis. We must plan for higher levels of production and higher rates of production in the event the world situation should demand such increase in airpower.

AVAILABILITY OF COLUMBIUM AND COBALT

With that rather nebulous requirement in front of us, we do not feel easy at all with respect to the supply of columbium and cobalt, for two reasons: One is that the world supply is marginal to our requirements, and we may not expect it all. That would be expecting rather too much because other military or defense uses also exist. Our No. 2 concern, or perhaps it should be No. 1—I am not establishing the priority of concern here—is that it is offshore supply. Columbium and cobalt are substantially offshore supplies.

Senator MALONE. At this time.

General METZGER. At this time.

Senator MALONE. Is the amount you are actually using annually considered classified information?

General METZGER. Yes; it is, Senator Malone. It is classified as "secret," and that classification extends pretty generally through the Department of Defense on these materials.

Senator MALONE. We do not want any classified material in the public record; but at a future date, if it becomes necessary, we can hear it in executive session.

General METZGER. If we were in executive session, I would be pleased to furnish such information.

Senator MALONE. Go ahead.

General METZGER. Mr. Chairman, unless you have some specific questions, I believe I have covered, very generally I know, our position.

Senator MALONE. Your concern right at the moment is that you have the necessary amount of these metals. At the moment you are concerned either with the stockpile, discovery or development of these materials on this hemisphere, to avoid dependence on offshore areas across one or both major oceans.

Is that your anxiety at the moment: to be sure there will be a supply available in the event of stepping up the program?

General METZGER. That is our concern, very definitely, that there be sufficient material available on this continent to support a production program which might be called for in the event of national emergency.

Senator MALONE. Is it your understanding, from the information available, that these offshore supplies would not be available in the event of an all-out war?

General METZGER. That is my understanding, and I believe your committee has received testimony which bears out fairly well that the sealanes, in the event of a war, would become very difficult to support, and to rely upon foreign sources for any of our critical materials would be a hazardous situation, to say the least.

Senator MALONEY. I think Major de Seversky put it about as concisely as anyone we have had before the committee. He said that the Belgian Congo, where we get uranium, and Nigeria, where we get a large amount of columbium, would be neutralized within a few hours.

When asked what he meant by "neutralized," he said they would be destroyed, made unavailable to us, or we could make them unavailable to our enemy, perhaps. However, since they were available to neither, if the enemy had a supply nearer home and we did not, we would be unable to make these engines of the efficiency that is necessary.

From your testimony now, I understand that through replacements and substitutes, to a certain extent, you can get the efficiency

in the jet engine that you need now, and that is what makes the amount of the material available ample at this time. I did not understand you to say that you had all the columbium you could use; that is to say, you are substituting, replacing, but perhaps you would use more columbium if it were plentiful.

CONSERVATION AND SUBSTITUTION OF MATERIALS

General METZGER. I do not believe that we would ever permit the pendulum to swing the other way. We have started now, as I explained, to minimize our requirements, to reduce our requirements for columbium, tantalum, chrome, cobalt, and nickel, because we are aware that the supplies are limited and that they are largely offshore supplies. If it were to become available in additional quantities——

Senator MALONE. In this hemisphere?

General METZGER. In this hemisphere, I believe we would continue to exercise conservation. Our research indicates that about 1 percent of columbium and tantalum, of this country's requirement, is produced in this hemisphere. Consequently, the exploration and the production of 99 percent of this country's requirement would be necessary in order to make it self-sufficient. I don't see that at all, and I believe it will take a long time to accomplish such an additional supply within this hemisphere or this continent. We shall undoubtedly continue to substitute and conserve in those requirements.

Senator MALONE. Your objective has been, then, for a considerable time, the development of alloys containing different amounts of these minerals which will withstand the heat of your jet engines, and when you develop such an alloy, is it a permanent fixture?

General METZGER. It is a permanent fixture as long as it does the job. If that alloy is not sufficient to withstand the temperatures or any of the other operating conditions of the engine as the thrust power of the engine increases—along with which increase in power comes increased heat—then we look for alloys which will do the job.

Senator MALONE. That is your continual search, to keep ahead of the necessities of the increased heat and thrust, and so forth?

General METZGER. Yes, sir; to continue to do that, and at the same time not commit to those alloys, materials which are in short supply or for which we are dependent upon a foreign source.

Senator MALONE. We have other witnesses who will develop the sources, but again I will ask you: Is it your opinion that our sources in Africa are very vulnerable to air attack, and also to destruction of the ports through atomic bomb attack, in the case of an all-out fourth world war, or whatever number they call it?

General METZGER. Yes, sir, it is my opinion that they are vulnerable to foreign attack, subversive action, and many other causes for shutdown or stoppage of supply.

Senator MALONE. And probably internal sabotage?

General METZGER. Yes, sir.

Senator MALONE. In other words, you just would not want to be dependent on Africa, or any nation beyond a major ocean, for minerals you had to have in your planes?

General METZGER. It is very hazardous, Senator Malone. Certainly to the extent possible we would like to be self-sufficient in our materials, self-sufficient within this hemisphere and, if possible, this continent.

Senator MALONE. General, we thank you very much for coming down, and if you have the time we would appreciate it if you would just move down the table and stay with us here as long as you can.

General METZGER. Thank you very much.

Senator MALONE. Next we have Mr. Herman H. Hanink, manager of the metallurgical engineering, Wright aeronautical division of Curtiss-Wright Corp., Wood-Ridge, N. J.

## STATEMENT OF HERMAN H. HANINK, MANAGER, METALLURGICAL ENGINEERING, WRIGHT AERONAUTICAL DIVISION, CURTISS-WRIGHT CORP., WOOD-RIDGE, N. J.

Senator MALONE. Mr. Hanink, we are glad to have you with us this morning. You know the objectives generally of the committee, which are to determine the availability of these critical materials to the United States in time of war, for our increasing and expanding economy, and for our security under Senate Resolution 143.

Would you identify yourself for the purpose of the subcommittee, and proceed your own way?

Mr. HANINK. Herman H. Hanink, manager, metallurgical engineering, Wright aeronautical division, Curtiss-Wright Corp., Wood-Ridge, N. J.

Shall I describe my capacity?

Senator MALONE. Yes, for the benefit of the record, I think so.

Mr. HANINK. In this capacity I am responsible for determining the types of materials that will go into our products, which are aircraft engines. To a similar extent I am responsible for seeing to it that the Air Force objectives, in terms of General Metzger's description, are carried out. I think that about covers it.

Senator MALONE. Proceed with your statement, if you have a statement to make for the committee.

Mr. HANINK. I would say that in terms of the end use of cobalt and columbium, there are two necessary approaches already described in general by General Metzger. One is to reduce the quantities of cobalt and columbium required. The other is to see to it that there is a maximum supply of these two elements made available.

These two objectives may or may not be entirely met in terms of the quantities of engines or any other product using them and for which the military has a demand in time of war in particular, but we think we have to maintain our efforts in both of these directions.

### EFFICIENT USE OF COBALT AND COLUMBIUM

Our particular objective, which is the proper use and minimizing of the use of these two elements, is carried out in three basic directions:

First, the more efficient use of the elements, cobalt and columbium, in a technical sense. As General Metzger has pointed out, this particular program has been carried perhaps very close to the ultimate in our current military engines, particularly gas turbine engines, al-

though there is possibly more room for improvement in this particular area.

To illustrate, there is still considerable columbium used in type 347 stainless steel, which is a very common stainless steel, which perhaps could be totally eliminated by exploiting the use of extra low carbon 18–8 stainless steel. This is entirely possible, and is actually being practiced, through the availability of very low carbon ferrochromium to the steel industry.

Senator MALONE. Describe for the benefit of the committee what you mean by low-carbon stainless steel.

Mr. HANINK. The 18–8 chromium nickel stainless steel which we are talking about here is very commonly held, in the aircraft use, to about 0.1 percent carbon, maximum. This amount of carbon, although low, can still be detrimental under certain conditions to the corrosion resistance of the material, and of course that is one of the major reasons for its use. Therefore, we need columbium, in the case of type 347 material, to render this amount of carbon present harmless in the sense of corrosive attack. It combines with the carbon and allows the chromium to do the job that it was put in there for, instead of itself combining with the carbon.

Obviously, if the carbon is totally eliminated, or to all practical purposes eliminated, then you do not need the columbium to neutralize it.

Senator MALONE. That is what you mean by low-carbon stainless steel?

Mr. HANINK. That is what I mean. And by low carbon quantitatively, I am talking about perhaps 0.03 percent carbon instead of the 0.1 percent carbon that might be more typical of the stainless steel containing columbium.

We have in this regard also been able to use titanium for the same purpose as the columbium, but we have found that except where absolutely necessary, our suppliers would rather use the columbium for the carbon stabilization in 18–8 steel.

Senator MALONE. Is that because of the scarcity of the titanium, or that the columbium does a neater job?

Mr. HANINK. It does a neater job. That is well put, because the use of the titanium in the producers' mills tends to give you a higher percentage of rejectable material due to the oxidation of the titanium during the steelmaking practice.

Senator MALONE. But you can use it and overcome those difficulties if you just did not have the columbium?

Mr. HANINK. Yes, sir, that is correct.

Senator MALONE. And get the same efficiency or a sufficient heat resistance?

Mr. HANINK. That is generally correct. However, at the moment, the minor problems in connection with the use of titanium-stabilized stainless steel sometimes make it appear reasonable to use columbium-stabilized material.

As General Metzger has said, we believe that we ought to practice now what we are going to need in wartime, and not relax our efforts in any sense. For that reason we are holding the line against the use of columbium-stabilized 18–8 stainless steel.

Senator MALONE. You have made great progress in these experiments over the last few years, have you not?

Mr. HANINK. We have not only made progress, but we feel that for practical purposes the job is licked.

Senator MALONE. That means substitutes for columbium and cobalt and replacements for them?

Mr. HANINK. That is correct.

There is one other approach. We have been dealing here with the more efficient use of columbium; also the more efficient use of cobalt. There is one other aspect of that, and that is through design refinements in the engines themselves, which has not been touched on but which is certainly a most important avenue of alloy reduction. There is no question but that the last several years have brought about advances in the technique of designing engines which do not need such large quantities of these critical materials in order to achieve the performance that the Air Force must have.

Senator MALONE. Then these investigations in which you are engaged take in the whole picture of producing an engine that will do the work, regardless of materials?

Mr. HANINK. That is correct, sir.

Senator MALONE. Let me ask you this at this point—a question which may become important in the committee's consideration later: Even with these substitutes and alloys replacements, if you had the amount of columbium you actually need, would it be more satisfactory? Is there any reason why you would rather have the columbium if you could get it?

Mr. HANINK. In our particular instance, we are not too sure that the columbium is an absolute essential to our doing the job that has to be done.

Senator MALONE. Do you use any columbium?

Mr. HANINK. The only columbium that we are using at the moment is in welding rods for the welding of stainless steel, because there titanium, when used in place of columbium, burns out in the passage of the metal across the arc in the case of electric-arc welding.

Senator MALONE. You are talking now about the welding job itself?

Mr. HANINK. The welding job itself.

Senator MALONE. But the titanium, outside of the welding job, and these other substitutes and replacements that you have mentioned, are just as satisfactory?

Mr. HANINK. That is correct. As a matter of fact, when we talk substitutes, we are not necessarily talking about replacing columbium with titanium or with tungsten. We are talking about alloys which have been developed, and are being developed at such a rapid rate that anything we say here is liable to be very tentative——

Senator MALONE. We hope.

Mr. HANINK. We hope. They do not need any of these critical elements with the exception of nickel and/or cobalt.

Senator MALONE. Is there not a possibility that with your laboratory work and your experiments, some of these very scarce materials might not be needed at all or would be needed in much smaller quantities?

Mr. HANINK. That is very correct.

Senator MALONE. Back in World War II Harry Dexter White in a memorandum to Morgenthau claimed that we would be out of petroleum, tungsten, and 8 or 10 other crictical materials in a certain number of years. Therefore, that was proof that we had to save our mate-

rials and import them from foreign nations. At that time Morgenthau wrote the same memorandum to President Truman and Mr. Truman announced it to the country without knowing where it came from. White's memorandum to Morgenthau did not take into account future discoveries or laboratory work which has been going on for half a century and has resulted, as men in the business know, in a complete change within a reasonable time of the material you are using for your production.

Putting it another way, any company that stops its laboratory work for 5 years could very easily be out of business.

### TECHNICAL PROGRESS

Mr. HANINK. I would like to amplify for further illustration the remark that you just made on the subject you were just covering in terms of technical advances. We have—again including cobalt as an essential in this picture so far—been able to increase the allowable temperature for a given strength level with an alloy recently announced by the International Nickel Co. research people, about 100 degrees over that of a very common alloy which contains 4 percent columbium, tungsten, and molybdenum, as well as a fairly substantial amount of cobalt. The latter alloy of course has been much better proved in service. I only mention this new alloy because on the face of it, it appears to illustrate the point that you made, that we can do the job better and probably will do it better with less of the critical materials that we are discussing.

Senator MALONE. That all goes to prove that predictions on future sources of supply of our strategic and critical materials cannot be accurate unless the results of our research are taken into account. One of our greatest resources is our technical knowledge.

Mr. HANINK. That is correct. I believe that, given freedom of selection of materials to do the job, which is to say continuation of the policy of "give us the power and the low weight that we need, and do it in a good engineering way," we will automatically reduce the critical elements, and I believe that there will be a somewhat automatic balance between our requirements for one alloy as compared to another; in other words, that we probably will not fall into the pitfall of all deciding that we are going to use nickel in place of cobalt or vice versa, which could be a rather bad situation, too.

### CONTINUATION OF CONSERVATION PROGRAM RECOMMENDED

I think our main recommendation would be that we maintain our pressure on this conservation picture as it has been for the past few years, and that this has and will have the effect of stimulating this laboratory work and the advancements in design and metallurgy that we need to really safeguard our interests in this critical alloy requirement.

Senator MALONE. One of the criticisms of the Army, Air Corps, and Navy is that, in planes particularly, they have tried to design the planes with the materials available rather than giving the companies the specifications, that is, the speed and the range that they want, and let the airplane manufacturers design a plane that will meet their specifications.

Mr. HANINK. Yes, sir.

Senator MALONE. I have been informed that they are changing or have already changed, and now are merely giving you the specifications desired and then leaving it to the plane manufacturer to work out the methods to accomplish that. Is that not what you need? Then make the sale of your product profitable so you can make some money if you do your laboratory work.

Mr. HANINK. Yes, sir. The competitive aspect of our particular business, made possible by this policy, has been the greatest stimulating factor in the whole situation.

Senator MALONE. Then you have to continue your research to keep up with your competitors in meeting the specifications sent out by the Army or the commercial planes.

Mr. HANINK. That is correct.

Senator MALONE. Go right ahead.

Mr. HANINK. I have very little more to say unless you have further questions, except that there would be a danger in overemphasizing the negative side of this story that I have elaborated on here, in the sense that if we don't know in the future how little columbium we are going to need, then neither do we know how much we are going to need, and we should assume that this element—which certainly has a place in this alloy picture, and a very substantial one—is going to be required in as large an amount as we are able to get it.

Senator MALONE. I have heard the general testify 2 or 3 times on other materials. Don Douglas, of Douglas Aircraft, and Bob Gross, of Lockheed, testified—I think I am quoting them correctly, and it is already in evidence—that we need a certain quantity of titanium. But, if we were to enter a war and were required to double or treble the manufacture of planes then there would be an entirely different requirement. That is what you are trying to say: that you want to know this is going to be available with the alloys you know you can make.

Mr. HANINK. That is correct, sir.

Senator MALONE. We do not want any classified material in the record at all. If there is anything that is classified that I ask you for, then we may ask you to give it to us in an executive session.

With the contracts that you have and with the alloys that you have already developed, what is your requirement for columbium and cobalt?

Mr. HANINK. In our jet engine picture, as General Metzger said, the information is largely classified.

Senator MALONE. Give us anything you can give us as an indication, without any classified information.

Mr. HANINK. Perhaps I should ask General Metzger if the statement on the J–65 would be similarly classified.

General METZGER. I would prefer that it be furnished in executive session, Senator Malone.

Senator MALONE. We will get that later when we come to it in executive session.

Mr. HANINK. I would like to reinforce the recommendation once more for the record, that conservation which has been put into the Air Force contracts as a prime competitive objective, be continued as an objective so that the efforts which must start a matter of years before the accomplishment of true conservation can be continued as a measure of accomplishment.

Senator MALONE. You speak of an objective. How is that objective arranged in a contract or made the objective of your company?

Mr. HANINK. Competitively speaking, we talk in terms of, first, low weight, high power, low fuel consumption.

We have added two new objectives which we are talking about here. One is conservation and the other is producibility; to make more engines at a lower cost in dollars and lower cost in strategic elements.

Senator MALONE. That is your competition between engine companies?

Mr. HANINK. Yes. The latter two objectives are fairly modern ones in the sense that they have existed for only the past few years. We think that they are just about as worthwhile as the tried and true requirements of power, light weight, fuel economy, and range.

Senator MALONE. Perhaps that has become necessary because of the changes the last few years in the range of bombers made possible by lighter and stronger materials in the jet planes and the atomic bomb, and making unavailable materials from offshore areas across one or both major oceans.

Mr. HANINK. That is very true, Senator, plus the fact that our experience in the last war taught us the importance both of our alloy conservation and the need for high producibility.

Senator MALONE. Define "high producibility" again for the record.

Mr. HANINK. We in our company call producibility the ability to make more engines per dollar, which automatically implies the improvement of production techniques to accomplish this purpose. I might add that these alloying elements that we are talking about, these strategic elements, are also very expensive. So in that sense it is not only good engineering to eliminate them for the purposes we are discussing here today, but also to save money.

Senator MALONE. The scarcer they are, the higher the price?

Mr. HANINK. The higher the price.

Senator MALONE. Do you have knowledge of or do you use rutile in any of your welding operations?

Mr. HANINK. Yes. Rutile is used in the coatings for our welding rods. It is not a very large use, since the amounts required are relatively small in terms of the overall picture.

Senator MALONE. Then it is not relatively too important?

Mr. HANINK. We have not considered it so.

Senator MALONE. Other materials can be used for such coatings?

Mr. HANINK. Can and are. In fact, sometimes in preference to the use of rutile.

Senator MALONE. So far there has been a relatively small amount of rutile found in this country. We are importing it from Australia in making titanium at the Henderson, Nev., plant. Of course, in the event of war that would be unavailable, and there are certain operations going on at this time, with every likelihood of success, within this hemisphere.

If you have no further statement, Mr. Hanink, we appreciate your appearance here very much, and if you have the time to stay with us a while and you have anything further to offer, we would be glad to have it. If not, we will send you your testimony for editing and correction and for completeness.

Mr. HANINK. Thank you very much.

Senator MALONE. Mr. W. L. Badger, General Electric Co., Aircraft Gas Turbine Division, Cincinnati, Ohio.

Mr. Badger, you have heard the testimony so far this morning, and you understand the objectives of the committee. We are very glad to have you with us. If you will identify yourself for the purposes of the subcommittee, and then proceed in your own way with your statement.

## STATEMENT OF W. L. BADGER, MANAGER, SMALL AIRCRAFT ENGINE LABORATORY, GENERAL ELECTRIC CO., LYNN, MASS.

Mr. BADGER. First may I make the correction that I am not from Cincinnati, Ohio. My name is W. L. Badger. I am manager of the Small Aircraft Engine Laboratory in Lynn, Mass.

Senator MALONE. Go ahead.

### IMPORTANCE OF ALLOYS, RESEARCH, AND CONSERVATION

Mr. BADGER. The gas turbine became a practical engine only after high-temperature alloys were developed. The use of these alloys in critical parts of the turbine allowed speeds and temperatures to be raised to figures previously believed impractical. A whole new series of alloys, rich in cobalt, columbium, nickel, tungsten, molybdenum, and chromium, have had to be developed. The problem that has faced the industry is to develop an alloy which has the best strength and at the same time the most desirable balance, or least amount, of critical elements. Cobalt provides the highest strength base material, short of the refractory alloys, and columbium or columbium-tantalum is one of the most effective strengtheners available. Alloys such as type 347 stainless, S–816, are typical columbium and cobalt bearing alloys.

Cobalt-base alloys such as L–605 and H. S. 21, without columbium or tantalum, are also used. A glance at the attached figure, which is on the last page of this statement, shows the advantage of the nickel- or cobalt-base alloys over iron-base alloys in resisting failure under heavy loads at high temperature.

Critical alloy-reduction programs have been actively sponsored by both the United States Air Force and the General Electric Co.

Senator MALONE. May I ask you a question at this point? You say the program has been sponsored by the United States Air Force. Do they do that in contracts with your company?

Mr. BADGER. That was a separate contract for the reduction of strategic materials in the J–47 engine, I believe.

Senator MALONE. You experiment in alloys and you get paid for the work that you do in this regard?

Mr. BADGER. That is correct.

Senator MALONE. I think that was a very laudable undertaking.

Mr. BADGER. These programs have substantially reduced the cobalt or columbium content in certain engines. For instance, the columbium content of one engine was reduced 75 percent by a complete substitution of type 321 for type 347 stainless. In another engine M–252, a nickel-base alloy, is replacing S–816, thus reducing both the cobalt and columbium usage. In some engines tantalum-columbium has been substituted for columbium, and since tantalum-columbium is more

available, the critical alloy usage has been eased. Substitution programs often involve very substantial development programs to determine the properties of a new material in the laboratory.

Promising materials are then applied to existing engines or new engine models and exhaustively tested under test stand conditions to establish their dependability. Finally, production quantities are ordered and built into engines. The time cycle for testing and filling pipelines with a new material is long, and sometimes makes impractical such subtsitutions in engines with short or indefinite phase-out dates. Substantial reductions in strategic alloy are being designed into new engines. Silicone aluminum paints have allowed the use of low-alloy steel for certain sheet applications. Details of our strategic alloy reduction program are classified and, therefore, unavailable to a public meeting.

Senator MALONE. If it becomes necessary for the committee to know more about these alloys, I suppose, General, you have the necessary information.

General METZGER. We have the reports which have been rendered by the General Electric Co. in connection with the project which Mr. Badger mentioned.

Senator MALONE. If you did not have the particular information, you could secure it from the companies very readily?

General METZGER. Other than proprietary information, yes, sir.

Senator MALONE. By "proprietary information," you mean information that is generally considered patentable?

General METZGER. Or a trade secret.

Senator MALONE. Go ahead.

Mr. BADGER. As opposed to the critical alloy reduction program is a never-ending effort to use higher temperatures and to reduce the weight of the engine in order to improve the operating characteristics. Thus, the engineer who is designing a new engine, while mindful of the shortages of critical alloys, finds himself driven by these circumstances to seeking the strongest material he can find—strongest in rupture strength, in creep strength, in fatigue strength, in impact, and notch toughness. Then comes the question of reliability, which is perhaps the best way to save strategic materials, for long, dependable life saves repairs, overhaul, and replacement, and reduces the requirement of servicing.

In this regard the G. E. J–47 is outstanding:

> Allowable flying time between overhauls has been multiplied more than 80 times during last 5 years. Savings of over $100 million will be realized by USAF as result of a 199-percent increase in the life expectancy of the J47–25 engine. Because of this tremendous increase in engine service life, the number of engines required to support the Boeing B–47 program was reduced.

This is a quote from the Aircraft Yearbook for 1953.

Senator MALONE. That is where an Air Force project paid off.

Mr. BADGER. Very much.

Senator MALONE. Over the last few years, the speed, durability, carrying capacity, have all been advanced unbelievably.

Mr. BADGER. That is correct.

Senator MALONE. Something that engineers never dreamed of 10 years ago.

Mr. BADGER. I am sure of that. The allowable overhaul time on this engine is now 1,200 hours.

Senator MALONE. The reason I mention that is because the public knows nothing about it, and I feel this is something they should know.

Mr. BADGER. It must be noted that several of the substitutions made have "robbed Peter to pay Paul" since nickel and molybdenum tend to increase as cobalt, columbium, or tungsten are decreased. The availability of nickel during the war years was substantially more of a problem than cobalt and columbium. Paraphrasing this, it might be said that availability of cobalt, columbium, and tungsten should be increased so that there would be adequate nickel and molybdenum.

Senator MALONE. You are talking about World War II or the Korean war, that I call No. 3?

Mr. BADGER. I think it has been true in both wars.

Senator MALONE. We have had testimony before the committee that our foreign sources such as Africa and India will not be available in the event of war.

Mr. BADGER. I am not a military tactician, but it does not sound impossible to me for nickel to be knocked out of the picture up around Sudbury, Ontario, too.

Senator MALONE. The committee will have to depend entirely on expert testimony. They do say so far that the Western Hemisphere will be the only dependable source. That seems to sum up the testimony so far.

Mr. BADGER. Trends in the jet engine industry to still higher temperatures may indicate that even greater amounts of cobalt and columbium per engine will be used. Then, too, these materials may not be adequate for certain critical parts, and molybdenum alloys or ceramets may have to be used. I may add that the ceramets are made often with the cobalt as a binder.

Senator MALONE. Describe a ceramet.

Mr. BADGER. A typical ceramet might be titanium carbide in a nickel binder. It gets its name in that it is a combination of ceramel and a metal. It has intermediate properties between the two types of materials.

These materials are still in the laboratory stages. Effective oxidation protection for molybdenum allows and suitable impact strength for ceramets are still being sought by both Government and civilian agencies. Another avenue to higher temperatures may be found in design by effective use of air cooling on the hottest parts of the engine.

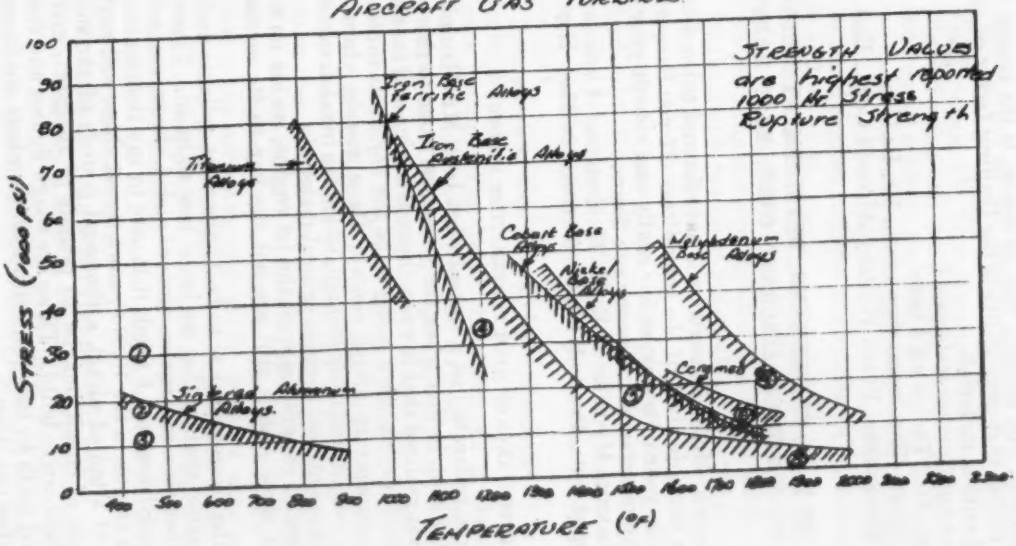
Since stockpile figures, production figures, and total all-out-war engine figures are classified, it is inappropriate to say in a public meeting whether there is now adequate available cobalt, columbium, or tantalum for aircraft engine usage. It is perhaps proper to say that in wartime, through substitutions, all alloys become critical and availability becomes the limiting factor in building dependable wartime products.

On the last page I have what you might say is a sketch which shows the temperature and stress for which different types of alloys are suitable. You will notice down at the bottom we have aluminum titanium alloys, and then we come up to iron base alloys, and nickel and cobalt base alloys, and also ceramets and molybdenum alloys.

Senator MALONE. That complete text will appear in the record.

(The chart referred to follows:)

PROPERTIES OF MATERIALS and OPERATING CONDITIONS
IN
AIRCRAFT GAS TURBINES




TYPICAL OPERATING CONDITIONS (TEMP and STRESS)

① Steel Comp Rotor Blades
② Titanium " " "
③ SAP " " "
④ Steel Turbine Disc Rim
⑤ Steel Turbine Buckets
⑥ Cermet " "
⑦ Moly Alloy " "
⑧ Combustion Chambers.

Senator MALONE. Mr. Badger, that of course, is the reason for the hearing; we realize that availability is the limiting factor of all these strategic and critical materials.

Do you have any further statement?

Mr. BADGER. No. That is all I have.

Senator MALONE. Thank you very much, Mr. Badger.

Mr. R. H. Thielemann, Pratt, Whitney Aircraft Corp., East Hartford, Conn.

## STATEMENT OF R. H. THIELEMANN, DEVELOPMENT METALLURGIST, PRATT, WHITNEY AIRCRAFT CORP., EAST HARTFORD, CONN.

Senator MALONE. Mr. Thielemann, you have listened to the evidence, and you know the objectives of the committee. If you have a statement, proceed in your own way, either orally and submit your statement, or read your statement, however you desire.

Mr. THIELEMANN. My name is R. H. Thielemann. I am development metallurgist with Pratt, Whitney Aircraft, in East Hartford, Conn.

### IMPORTANCE OF HIGH TEMPERATURE ALLOYS

I would like to reiterate just a second what both Mr. Hanink and Mr. Badger have said, in that when the jet engine came to this country in 1941, it was realized that it was a thermal engine and that high-temperature alloys were always going to be the key to its success.

Those high-temperature alloys contain those metals, chromium, nickel, tungsten, cobalt, and molybdenum, which are in relatively short supply, and we have classed them as critical materials.

In our 13 years of experience with the jet engine, we see no trend to indicate that these metals still are not the key to its successful performance.

Our job for the Government is to build the most reliable and the highest performance engines that we know how to build. Those engines of course then require large amounts of nickel, chromium, cobalt, tungsten, and molybdenum. I think it is safe to say that an engine today, a modern engine in the 10,000-pound thrust class, will require maybe upward of a ton of nickel, a thousand pounds of chromium, about 100 pounds of cobalt, maybe 30 pounds of tungsten, and 50 pounds of molybdenum to build. Those are rough figures and can be adjusted back and forth by using substitute alloys where one becomes critical and another one doesn't.

Senator MALONE. You are talking about one engine?

Mr. THIELEMANN. In any engine today in that 10,000-pound class, that is roughly what anybody will have to use to build that engine.

Senator MALONE. A jet engine?

Mr. THIELEMANN. For a modern jet engine. Isn't that right, General?

General METZGER. That is correct.

ELIMINATION OF COLUMBIUM THROUGH USE OF TITANIUM

Mr. THIELEMANN. Of these metals, our policy at Pratt, Whitney was to try to develop and build an engine that could be built in wartime assuming all sealanes were cut off. So we saw right away that columbium and tantalum, and columbium in particular, could be a very critical metal should we lose the African source. Hence, we decided we would build engines without columbium, let's get it out of the way forever; and we have.

In our opinion, columbium is the one metal that in wartime and full mobilization we could do without, as far as jet engines are concerned. Today we are using some columbium in the engines, in some stainless steels, for the simple reason of availability. Our vendors make products with columbium rather than titanium because it is easier to do for them. It is more available.

Time factors are important. I would estimate we may use 1 or 2 pounds of columbium per engine. But it is something that could be eliminated tomorrow if someone said "There is no more columbium."

Senator MALONE. You spoke of titanium. It is an important replacement?

Mr. THIELEMANN. You have to have titanium if you are not going to use columbium.

Senator MALONE. You heard the statement of the chairman this morning that I think we are on the verge of stepping up the production of titanium. Of course, I could not estimate the time, but within the reasonably near future that should not be a problem.

Mr. THIELEMANN. Titanium today, of course, is a very interesting metal to the aircraft industry for two reasons, two very good reasons. Whenever a metal or any material comes along that has engineering properties that can be used in the design of an engine and it saves weight, it is important. I think maybe there is another reason why we will use a lot of titanium that is in addition to the weight saving, and that is the corrosion problem in these jet engines. When they have to fly over the ocean, through rain, and pick up foreign materials, corrosion is a real problem with the chromium stainless steels. Titanium seems to be immune.

Senator MALONE. Is it the only metal that is absolutely dependable and immune from corrosion?

Mr. THIELEMANN. I wouldn't say the only metal.

Senator MALONE. The only available metal for your purposes?

Mr. THIELEMANN. I wouldn't say the only metal. Engineeringwise, you could use chromium nickel base alloys and have as good corrosion resistance.

Senator MALONE. But it would be much more expensive?

Mr. THIELEMANN. Today you don't want to classify titanium as being inexpensive. It costs more than sterling silver.

Senator MALONE. That is correct. I stand corrected in that regard. But we are looking ahead.

Mr. THIELEMANN. That is right, and so are we. We feel that it won't be too long before maybe a third to a half of the metal going into the jet engine is titanium. Should you mobilize today, I doubt that titanium would be important in the picture, because it is untried in combat. We certainly today, if we had to build engines with tita-

nium, couldn't build as many engines as we can with steel. I have a part in my briefcase if you would like to see a titanium part.

Senator MALONE. I would like to see it. It would be very interesting to the committee.

Mr. THIELEMANN. This is an experimental blade which has been machined out of a bar of titanium, and which we think is of sufficient quality that it will work well in the engine. The reason I point out that titanium today wouldn't be used in an M-day mobilization, if it started right now, is because the problem of making a shape like that efficiently, machining it from bar stock, is not an efficient way to make that part. We just don't know enough about the technology of titanium yet to stamp this part roughly to size and polish it and get the properties that are required in the engine.

Senator MALONE. What you say is very interesting.

Mr. THIELEMANN. But we are learning, you see.

Senator MALONE. I know this will be interesting to the committee. However, our experience with titanium will probably be like aluminum, which cost $500 a pound when it was first made, and we knew nothing about working it. Now it looks as if there is enough interest in titanium, officially as well as industrially, so that we are really going to get into production. The committee is very much interested in it. If you had all the titanium you needed, then do you believe with experience in shaping and machining it, the expense would be reduced?

Mr. THIELEMANN. Oh, yes, there isn't any question about that. I can give you one figure. When we first started to use titanium in one engine, we were buying roughly a ton of titanium to make 300 pounds of finished parts. That was a year and a half ago.

Senator MALONE. What is it now?

Mr. THIELEMANN. Today that figure is about 1,100 pounds, and it is still going down. That is, we are learning how to use titanium. That figure should be around 800 pounds. We still have some reduction to make in it.

Senator MALONE. When they learn how to convert the scrap, that will further reduce the expense. Testimony has been given before the committee that they expect to be able to convert the scrap within a reasonable time.

Mr. THIELEMANN. Look at the thin edge on that blade, which is typical of aircraft jet parts. You can see that corrosion on a thin part like that could be very detrimental. The excellent corrosion resistance is one of the very interesting properties of titanium.

Senator MALONE. I understand that stainless steel is subject to enough corrosion so that if it is thin, like this part, it creates quite a problem.

Mr. THIELEMANN. Let's pin down the stainless steel a little bit. The stainless steels that are conventionally used for those parts contain 12 percent chromium and the rest iron. That is almost standard in the industry. Those do rust.

Senator MALONE. Is it necessary to use less chromium to maintain the necessary strength?

Mr. THIELEMANN. We could use higher percentages of chromium and probably lick the rust problem.

Senator MALONE. And have enough strength?

Mr. THIELEMANN. Yes. We could do that.

Senator MALONE. Is there anything to the theory of the extrusion method that would help in a piece of material like this blade?

Mr. THIELEMANN. I don't know about that blade. I look upon extrusions as a big help in working all of these jet metals.

Senator MALONE. In reducing the scrap?

Mr. THIELEMANN. In reducing ingot down to bar form, we certainly can save a lot of material by extruding it.

Senator MALONE. In other words, an extrusion would make this blade several times as thick as it now is, but much thinner than if you started from the bar?

Mr. THIELEMANN. That is right.

Senator MALONE. Go ahead. This is very interesting to the chairman of the committee, and I am sure it will be to the committee.

Mr. THIELEMANN. On titanium, I would like to add a little more. It was indicated, I believe—and I don't believe General Metzger wanted it to be that way—that it may be a replacement for the high-temperature alloys. We don't believe that is its picture at all, and I am sure he will agree. It replaces the columbium that is used to stabilize carbon and stainless steels. It replaces the cromium iron alloys that are used for such parts as this, and it replaces, in fact it improves where you normally would use aluminum. You use titanium and you help yourself a lot.

Senator MALONE. It is lighter, with the same strength?

Mr. THIELEMANN. Its temperature use today with the alloys that have been developed is running to about 700 degrees Fahrenheit. There is every indication that we will probably go to a thousand with titanium before we are through.

Senator MALONE. Within the reasonably near future?

Mr. THIELEMANN. Oh, yes; within a year.

Senator MALONE. Your testimony is extremely interesting. Go ahead.

Mr. THIELEMANN. I merely want to leave the one thought that we don't think columbium, as far as the jet-engine picture is concerned, is something that is so all-important. We can build engines without it.

Senator MALONE. Where would it be important or indispensable, then?

Mr. THIELEMANN. I think the Atomic Energy Commission would have some uses where it would be indispensable.

Senator MALONE. But as far as you know——

Mr. THIELEMANN. As fas as the jet engines are concerned, and Pratt, Whitney in particultr, we can build jet engines today for the Air Force and the Navy without sacrificing any reliability and performance, and use no columbium.

Senator MALONE. With regard to future requirements—do you believe you will be able to continue to build jet engines without columbium?

Mr. THIELEMANN. Yes, sir. Cobalt and tungsten and nickel are always going to be important, however.

Senator MALONE. How about cobalt?

Mr. THIELEMANN. Cobalt is the key to higher temperatures. There is a trend still to higher temperatures and still more cobalt.

One of the interestings things, Senator, if you go back and plot the pounds of these alloys that have been used away back in piston-engine

days, pounds of nickel, chromium, tungsten, molybdenum, per horsepower, the value is pretty much constant even in the jet engines of today. The same figure of around 0.4 of a pound total alloy per horsepower exists today. The only thing that has happened to us today is that the jet engines have so much more horsepower that the use of these elements is stepped up terrifically.

Comparing the World I days of 1,000 horsepower, against the turbine that is developing 30,000 or 40,000 horsepower today, you just multiply the requirements for those metals by that figure.

Senator MALONE. You are speaking of cobalt?

Mr. THIELEMANN. I am speaking of the metals that go into high-temperature alloys—nickel, chromium, cobalt, molybdenum, and tungsten.

Senator MALONE. They are indispensable at the present time?

Mr. THIELEMANN. Yes. They always will be indispensable, as far as we can see.

Senator MALONE. Titanium, then, is limited to the temperature it will stand, which is around 700° now. You have said you think it will reach 1,000° within a limited time. It is a weight-saving device and corrosion-resistant.

Mr. THIELEMANN. But you can save a lot of weight. There is a lot of the weight of an engine that is below 1,000°.

Senator MALONE. Yes. We had testimony here, I believe, that 1 pound saved in the frame of a plane and known ahead of time that it was going to be saved through the use of titanium or any other metal, but titanium was under discussion, would amount in the total saving in wingspread and engine weight and all other parts, of perhaps 8 to 10 pounds.

Mr. THIELEMANN. That could be, but General Metzger will have to answer that one.

Senator MALONE. Yes. He did answer it. Also Don Douglas and Bob Gross answered it.

Mr. THIELEMANN. It means a lot to us in one other respect, and that is on the "g" loadings on bearings. If we can lighten up the rotating parts it helps us terrifically in our engine.

Senator MALONE. That is extremely interesting. Describe that saving a little further for the record.

Mr. THIELEMANN. We don't know what its saving is. It is more a saving in reliability of the engine, Senator. If you take a large rotating part of a given mass and have it turn on its axis at so many g's, the loading on the bearings becomes terrific.

Senator MALONE. If it is only as heavy, it saves a lot of wear and tear.

Mr. THIELEMANN. Every pound you save, you save that weight multiplied many times, depending on how fast you are flying and the "g" turn by the load that the bearing has to take. We feel instead of having to build bigger and heavier bearings, we can use our same bearings and build higher maneuver loads with titanium.

Senator MALONE. That saves material and weight.

Mr. THIELEMANN. Yes.

I think that is about all I have, Senator.

Senator MALONE. Your testimony, Mr. Thielemann, has been very, very interesting to the committee. As usual, we will mail your testimony to you and you can revise it if you wish. We have these hear-

ings very informal so any statement that you might inadvertently make can be corrected. Thank you very much.

Mr. THIELEMANN. Thank you, sir.

Senator MALONE. Mr. Russell Franks, of the Union Carbide & Carbon Co., New York.

## STATEMENT OF RUSSELL FRANKS, MANAGER, TECHNICAL SERVICE AND DEVELOPMENT, ELECTRO METALLURGICAL CO., UNION CARBIDE & CARBON CORP., NEW YORK, N. Y.

Senator MALONE. We are very happy to have you here, Mr. Franks. You have heard the testimony. You know the objectives of the committee. Would you just proceed in your own way and give us anything you think would be helpful?

Mr. FRANKS. My name is Russell Franks. I am manager of the technical service and development department of the Electro Metallurgical Co., a division of the Union Carbide & Carbon Corp.

My duties are primarily to introduce to the steel and related industries the result of research work in the form of new products used as basic raw materials for making all kinds of steels and alloys.

I think, Senator, that just about describes my present duties. My previous experience had to do with the early development of stainless as a research metallurgist.

Senator MALONE. That is very interesting.

Mr. FRANKS. So far in the meeting this morning, the reference to columbium, and cobalt, too, has been made primarily from the standpoint of the aircraft industry.

Senator MALONE. That is true.

### COLUMBIUM—USES OTHER THAN AIRCRAFT

Mr. FRANKS. I would like to ask, is it proper to consider columbium in applications, other than the aircraft industry?

Senator MALONE. It certainly is. Cover any field that you care to, with particular reference, of course, to its use as a strategic metal and any production that relates thereto.

Mr. FRANKS. All right, sir.

I would like to go back to the period between about 1928 and 1932, when stainless steels were just beginning to become recognized as major materials of construction, used in all kinds of applications where resistance to heat and corrosion was important.

One of the most prominent types of stainless steel was what we called the 18–8 austenitic chronium-nickel steel, which has a combination of corrosion resistance, ductility, toughness, and otherwise engineering characteristics which I don't think are matched by any other material generally used for construction purposes. I think I can say this without any reservation whatsoever.

It was soon found out, after these chromium-nickel steels of the 18–8 type were put into various applications, that when the steel was heated in a temperature range between about 800° and 1,500° F., it utterly lost all of its resistance to corrosion, and actually disintegrated into a powder on subsequent exposure to corroding conditions.

A search was made for something to prevent this from taking place in the 18–8 steel. After a considerable amount of research work

was done at the Union Carbide & Carbon Research Laboratories, the only metal that was found to solve the problem was columbium. I can make this statement, I think, without any reservation.

The reason was that columbium could be added to the 18–8 steel and give a product which could be hot-worked, welded, or otherwise fabricated without destroying any of the good corrosion-resistance properties or any of the good mechanical properties of the 18–8 steel. To my knowledge, today this is still true.

As Mr. Hanink pointed out, we have been working in an effort to find a replacement for columbium, and in a measure we have found that by reducing the carbon content of the 18–8 type of steel and other austenitic stainless steels we can get some relief from this susceptibility to intergranular corrosion. But that relief goes only part way.

Senator MALONE. Do I understand relief from the corrosion occurs at those temperatures?

Mr. FRANKS. At those temperatures and also, Senator, for example, I might explain that if you weld a piece of 18–8 steel, you simultaneously heat the weld metal itself and the zones adjacent to the weld metal to temperatures within this range. If the carbon content of the steel, for example, is around 0.10 to 0.12 percent or even down to 0.06 percent, and the weld is exposed to strong corroding media such as you will encounter in the chemical industry, the weld and the zone adjacent to the weld will become badly corroded. In other words, all of the metal other than what is right next to the weld and what is in the weld will be perfectly all right; yet you will have a failure right next to the weld zone unless you have either the extra low carbon steel or columbium in the steel.

The extra low carbon 18–8 steel can be used for this purpose where the piece of equipment operates at room temperatures or up to about 500° or 600° or maybe 700° F., but if you are operating at temperatures in the neighborhood of 1,000° F. or 1,200° F., reducing the carbon content will not suffice and a steel containing columbium is needed. Also there is no substitute for columbium-bearing 18–8 steel castings.

I am emphasizing that you still need columbium because I am talking primarily of the chemical industry.

Senator MALONE. You are outside of the jet engine.

Mr. FRANKS. I am outside of the jet engine completely; that is right.

Other substitutes have been tried but have not given the satisfactory results in the chemical industry obtained with columbium.

Senator MALONE. The chemical industry has evinced great interest in titanium and in these alloys about which you are talking?

Mr. FRANKS. Yes, sir. I think it can be said that there are a good many processes in the chemical industry of enormous value to us that could not have been operated without stainless steel. I think that there are a good many of them that could be operated without stainless steel, but at a terrific cost. So I think that when you consider the columbium situation from the standpoint of its influence on our chemical industry, it must be considered in view of its use in stainless steel.

Senator MALONE. You are talking about temperatures above 700°?

Mr. FRANKS. Sir, I am talking about temperatures both above 700° F. and below 700° F. There are instances where equipment

is needed in which thickness has an important influence on the final resistance to corrosion. The thicker a piece is the longer you have to hold it to heat when you weld it, and, of course, the time factor at temperature has a very definite influence on the degree of loss of corrosion resistance.

Senator MALONE. You are into a subject beyond my ken, and if I ask a question that seems simple to you, it is for the information of the committee in our study.

The chemical industry has evinced great interest in titanium because of its noncorrosive qualities?

Mr. FRANKS. Yes, sir; that is correct.

Senator MALONE. There is, of course, a limit to the temperature range of titanium. We have just had a statement by Mr. Thielemann, that experiments underway probably would raise the working temperature of titanium to perhaps 1,000°, in which case titanium itself would be a substitute for many of these materials, would it not?

Mr. FRANKS. Yes, I think that is basically true.

Senator MALONE. We are in a new field.

Mr. FRANKS. Yes, sir. But I would like to point out at the same time that our general experience with metals of all kinds is that they find their peculiar niche; that no one metal ever displaces another; that the metals that are on the market today are all there because of the fact that they fit into our economy. I don't think that titanium, for example, will do anything other than what stainless steel has done. It will find its peculiar uses and will aid our economy, but will not take away from the stainless steel picture because stainless steel is resistant to certain types of corrosion that titanium will not resist.

Senator MALONE. Except for the point, perhaps, where lighter weight is needed and maybe greater corrosion resistance.

Mr. FRANKS. Sir, there are things other than weight. There is the matter of modulus of elasticity and other mechanical properties.

Senator MALONE. We are speaking principally, of course, about lighter weight in aircraft service where weight counts.

Mr. FRANKS. Yes. There are stainless steels that will probably be developed in the course of time which will have lightweight-strength ratios equivalent to titanium or probably better, and probably better than aluminum.

The situation is like a race, you see, and the metals all have to compete with each other economically.

Senator MALONE. You are speaking now of continuing the laboratory work that the chairman described an hour or so ago, that never stops and the results are never ended?

Mr. FRANKS. Yes, sir.

Senator MALONE. When they do end, the company that ends it is out of business.

Mr. FRANKS. That is right, sir.

I will discontinue my comments now in regard to the chemical industry and make one or two other remarks. I don't know whether the information I would like to refer to is classified or not.

Senator MALONE. You judge it for yourself.

Mr. FRANKS. We can strike it out.

Senator MALONE. What is it about?

Mr. FRANKS. It is about the construction of equipment for atomic energy.

Senator MALONE. I think I would not go too far into the atomic energy field except in a general way. You may discuss it generally and give us an idea of the information you have. Then we could get the details in an executive session.

Mr. FRANKS. Maybe I can just say that stainless steels containing columbium have been widely used in atomic energy equipment.

Senator MALONE. I did not hear you.

Mr. FRANKS. I say stainless steels containing columbium have been widely used in atomic energy equipment.

Senator MALONE. I think that is enough. You can tell us later if you wish to add anything which would be helpful to the committee.

### USE OF COLUMBIUM IN INCREASING HIGH-TEMPERATURE STRENGTH OF ALLOYS

Mr. FRANKS. The only other remark I would like to make in regard to the columbium situation is that, as Mr. Badger pointed out, columbium is one of the most effective metals for increasing the high-temperature strength of alloys. I think that in view of our jet engine position in which we need all of the metals which have been named, such as tungsten, molybdenum, columbium, titanium, chromium, nickel, cobalt, and so forth, we should have available all of the columbium that it is in our power to secure, because it will give us the opportunity of using it and all the other metals to the best advantage.

In other words, if we distribute our load under emergency conditions to utilize everything that we have, both in the stockpile and out, we are in much better shape than we are if we try to emphasize one metal too much over the other.

Senator MALONE. I think you are exactly right in that regard. The objective of the committee is only to determine the amount of columbium that would be absolutely necessary in the event of a war which would make our foreign sources unavailable. We have to determine the size of the stockpile and also the price that might be paid or guaranteed to anyone discovering and producing columbium. Its importance would be related to the price, and therefore the effort to find it.

Mr. FRANKS. Yes, sir, that is right.

Senator MALONE. We are trying to evaluate all this information so that our recommendations will be helpful to the country as well as our industry.

### IMPORTANCE OF COLUMBIUM IN DEVELOPING JET ENGINES

Mr. FRANKS. It is my opinion that we should continue to secure columbium and cobalt, as well as all the other metals which are pertinent in this picture.

It certainly is true that columbium up to now has played an extremely important part in the aircraft situation; that is, the jet engine as it now exists. There is no doubt in my mind, and I think that some of the representatives from Allegheny will back up this statement; that the S–816 alloy which is used as a blade material where the high temperatures exist and where it has to stay put, has certainly been of enormous help in developing the present pattern of the jet aircraft engine.

Senator MALONE. I have heard no testimony to the contrary. The testimony we heard that it can be dispensed with and still maintain the necessary efficiency was very interesting, because if that can be done, it simply means a less hazardous operation in the event we are a little slow in becoming self-sufficient in the Western Hemisphere.

Mr. FRANKS. Sir, I think that is a matter of opinion.

Senator MALONE. I think it is healthy to have difference of opinion.

Mr. FRANKS. Absolutely. That is simply a matter of opinion.

Senator MALONE. That means more work for the laboratories.

Mr. FRANKS. That is right. But I would like to emphasize that it has been very helpful, and I am certain that in the future it will also be when higher jet engine operating temperatures become necessary.

Senator MALONE. It certainly is helpful and General Metzger, whose opinion is regarded very highly by this committee, indicated that whenever the proper efficiency and the proper durability can be secured with an alloy made up of something more plentiful, we are in a safer position.

Mr. FRANKS. Yes, sir. I think we all appreciate that.

Senator MALONE. We have had testimony—and if I misstate it I stand ready to be corrected—from our Bureau of Mines engineers and our producers generally, on various products, strategic and critical materials, that the Western Hemisphere can be made self-sufficient on, say, a 2- to 4-year program, an intelligent planning program, considering substitutes and replacements.

I think that is very necessary. This committee is certainly going to study the entire record that it has made since Congress adjourned last year in August to determine if that is true. If it is true, it is very important, because we do have testimony that materials across one or both major oceans will simply be inaccessible within hours after the war starts. If that is true, and we could not become self-sufficient in substitutes and replacements within a reasonable time, it means quite a sizable stockpile.

Mr. FRANKS. Yes, sir.

Senator MALONE. So in order to remove the Nation from under the threat of what you might call a mild form of blackmail to enter into various treaties and arrangements not necessarily to our advantage, and to be assured that in wartime we can handle ourselves, that problem must be answered.

Mr. FRANKS. It certainly must.

Senator MALONE. That is the reason we are asking you fellows, whose time we know is valuable, to come down here and spend time with the committee.

Mr. FRANKS. My opinion, sir, is that I can't see where you could literally eliminate columbium from our economy today without its suffering tremendously.

Senator MALONE. I didn't understand we had any testimony that you could eliminate columbium, but I did understand that we had testimony that a jet engine under the present specifications could be made with the necessary durability and speed and weight without——

Mr. FRANKS. Of course, I could make no comment on that, because I don't know one way or another. But the comment I am trying to make is that I think that we should still consider it a very necessary metal as far as our economy is concerned.

Senator MALONE. I think the committee would agree with you wholeheartedly that if there is any material that lessens the expense of manufacturing an article needed, considering its durability and replacement and all, we should make every effort to make it available.

Mr. FRANKS. Yes, sir.

Senator MALONE. But in the event it is not available in sufficient quantity in the Western Hemisphere and it was not practicable to have a stockpile of the size you might need in a long war, then it would be very helpful if we had ways and means of doing without it.

Mr. FRANKS. But it would be very helpful to have as much as we could have, sir.

### PRICE INCENTIVE AS MEANS OF SECURING NECESSARY MATERIALS

Senator MALONE. If it is true that only the Western Hemisphere supplies are going to be available to us, and our well-known and experienced generals, who we feel are real military strategists, say that the Western Hemisphere will be our only dependable supply, then we come to a price incentive, perhaps, to get the materials that are absolutely necessary which are not available in the Western Hemisphere.

Mr. FRANKS. That is exactly what I was trying to say. You have said it so much better.

Senator MALONE. I did not say it better, but I got the trend of your testimony and I agree with you to that extent. Whatever we have to have, we have to have.

Go right ahead. Your testimony is very interesting to the committee.

### COLUMBIUM IN FIELD OF ELECTRONICS AND CUTTING TOOLS

Mr. FRANKS. I think, sir, that is about all I have to say. I would be very glad to try to answer your questions.

Senator MALONE. Would you like to comment any further—I do not understand you have covered it specifically—on the use of columbium or its necessity in the field of electronics and cutting tools?

Mr. FRANKS. As far as electronics are concerned, I don't think that the metal has become too well established. That field is in such a state of flux. I think what you are referring to is columbium compounds of one kind or another. Very frankly, I am not in a good position to comment on that question.

As far as the cutting-tool situation is concerned, I believe that there is a substitute for it now. It is used as a double carbide, as I understand it, for cutting tools. Ithink tungsten carbide will do that job. That is my opinion.

Senator MALONE. We thank you very much, if that completes your statement, for your trip here in the interests of the committee record. Your testimony will be mailed to you, and you may study it and make any corrections for accuracy and completeness that you care to.

Mr. FRANKS. Thank you, sir.

Senator MALONE. We have three men present here from Allegheny Ludlum Steel Corp.: Mr. Clark King, Dr. Rush Lincoln, and Mr. L. H. Bittner.

I will ask all three of you to come forward and proceed in your own way, whichever one of you would like to present his testimony first.

## STATEMENTS OF CLARK KING, EXECUTIVE VICE PRESIDENT; DR. RUSH LINCOLN, CHIEF METALLURGIST; AND L. H. BITTNER, VICE PRESIDENT AND DIRECTOR OF PURCHASES, ALLEGHENY LUDLUM STEEL CORP., PITTSBURGH, PA.

Senator MALONE. You have heard the testimony, Mr. King, and you are familiar with the objectives of the committee. We are glad to have you here. We consider your company one of the outstanding companies in the United States.

Would you proceed in your own way?

### AVAILABILITY AND USAGE OF COLUMBIUM AND COBALT

Mr. KING. Senator Malone, I have a brief statement here that refers to the availability and usage of these alloying elements.

I have with me here today Dr. Lincoln, who is chief metallurgist of our corporation, and Mr. L. H. Bittner, who is director of purchases.

Senator MALONE. You might identify yourself for the purpose of the record, and each one of your associates, and then will you interchange however you care to in your testimony?

Mr. KING. I am Clark King, executive vice president of Allegheny Ludlum Steel Corp., Pittsburgh.

Dr. Lincoln is chief metallurgist of the corporation, and Mr. Bittner is vice president and director of purchases. I am bringing those two men along with me, Senator, to be as helpful as we might to your committee.

Allegheny Ludlum Steel Corp. purchases cobalt metal in granules and rondelle form from the African Metals Corp., 25 Broad Street, New York City, at a price of $2.60 per pound. Our purchases for 1950 through 1953, which include the purchases of our wholly owned subsidiary, Arnold Engineering Co., range from 1,287,413 pounds annually to 1,658,099 pounds annually.

Cobalt is not on allocation, and at present we are able to purchase without difficulty our requirements. Cobalt was, however, on allocation as a result of Government order M–10, effective November 30, 1950, and later replaced with M–80, schedule 2. This control was removed June 30, 1953.

The Arnold Engineering Co. uses an average of approximately 40,000 pounds of cobalt per month for Alnico permanent magnets. Actual consumption in individual months may vary from 25,000 to as high as 60,000 pounds. A number of different composition magnets are made under the name Alnico and are differentiated by a number that accompanies the name. Only one magnet, Alnico No. 3, contains no cobalt. In this magnet considerable more nickel is present than in the others. This composition of magnet has the lowest magnetic-energy product, and as the content of cobalt is increased in the other compositions the magnetic-energy product increases proportionately. The magnet with the highest cobalt content has a magnet-energy product more than three times as great as that of the one containing no cobalt. The cobalt content of the Alnico compositions other than

No. 3 contains from 5 to 24 percent cobalt. Where high energy and low volume and weight product in a permanent magnet is required, there is no substitute for cobalt.

The Carmet division of Allegheny Ludlum is using cobalt oxide powder at the rate of approximately 1,500 pounds of contained cobalt per month. The cobalt is present in the sintered carbide as a binder, and the sintered carbides that we produce have an average cobalt content of 10 percent. In individual grades, the actual cobalt content varies from 6 up to 16 percent. There is no substantial substitute for cobalt as the bonding agent in sintered carbides.

In other products, Allegheny Ludlum has used during the past 4 years amounts of cobalt that vary from approximately 744,000 pounds in 1950 up to as high as approximately 1,400,000 pounds in 1951.

Our forging and casting division uses between 25,000 and 35,000 pounds of cobalt yearly in high carbon-high chromium hot die steels, chromium-nickel austenitic hot die steels, and in a cast alloy used as a metal-cutting tool. The cobalt content of the steels range from 1 percent up to 4 percent, while the cast cutting tool contains 42 percent cobalt. The equivalent of all of these steels is produced without cobalt but the hot hardness and accompanying ability to work at high temperatures is not present to the degree that it is present when the alloy contains cobalt. There is no substitute for cobalt, and if it is not present in the alloy poorer performance in cutting and working metals at high temperatures is obtained.

At our Dunkirk plant, the amount of cobalt used per year during the past 4 years has varied from approximately 28,000 pounds up to 35,000 pounds. This cobalt was used in high-speed tool steel and hot die steels. The cobalt is used in approximately 12 different grades of high-speed tool steels and hot die steels in amounts that vary from approximately 1 percent cobalt up to 7 percent cobalt. Compositions similar to these containing cobalt are made without the addition. These grades that do not contain cobalt are less expensive and do not have the ability to retain hardness at elevated temperatures to the extent that the grades containing cobalt are able to. In these steels, there is no substitute for cobalt, and if it is not present a less efficient material is obtained.

Our Watervliet plant during the past 4 years has used amounts of cobalt that vary from approximately 663,000 pounds per year up to as much as 1,243,000 pounds per year. This cobalt has gone entirely into high-strength, high-temperature alloys used for blades in jet aircraft engines. The principal alloys produced are S–816, Waspalloy, and M–252. S–816 was the earlier of these alloys and contains 42 percent cobalt. More recently, M–252 and Waspalloy have been developed that contain less cobalt and have been substituted we believe satisfactorily for blades in some jet engines. Waspalloy contains 13 percent cobalt, and M–252 contains 10 percent cobalt. Ten to thirteen percent appears to be the minimum content to which cobalt can be reduced in this application and obtain the necessary high degree of performance.

At our Brackenridge plant, the amount of cobalt used per year during the past 4 years has varied from 5,000 up to approximately 33,000 pounds. This cobalt was used for the production of permendur, a high-permeability iron-cobalt electrical alloy containing 48

percent cobalt. Where the electrical characteristics of this alloy are required, there is no substitute for the cobalt.

Allegheny Ludlum purchases from the Electro Metallurgical Co., division of the Union Carbide and Carbon Corp., ferrocolumbium containing 50 percent to 60 percent of columbium with a maximum of 5 percent tantalum. The price is $6.40 per pound of columbium contained. Our purchases in the years 1950 through 1953 ranged from 17,500 pounds annually to 166,343 pounds annually.

Ferrotantalum columbium is also purchased from the Electro Metallurgical Co. in the form of a ferro containing approximately 40 percent columbium and 20 percent tantalum. The columbium plus tantalum is 60 percent minimum. The price is $4.75 per pound columbium plus tantalum. Our purchases from 1950 through 1953 ranged from 73,100 pounds annually to 161,100 pounds annually.

Ferrocolumbium and ferrotantalum columbium are not on allocation and are not restricted on their end use. We are able to obtain our current requirements without any difficulty. Both of these alloys, however, were on allocation as a result of Government order M–3 effective October 19, 1950, later covered by order M–80, schedule 5. This control was removed June 30, 1953.

Our forging and casting division and the Arnold Engineering Co. use no columbium. Our carmet division used a small quantity of tantalum carbide in 1953 in the production of experimental sintered carbides. This is experimental.

At our Brackenridge, Dunkirk, and Watervliet plants, type 347 stainless steel containing a maximum columbium content of 1 percent is produced regularly. In some applications .03 percent maximum carbon 18–8 steel, type 304, as well as type 321 stainless steel would be an acceptable substitute for the type 347 stainless steel. However, in some applications there is no substitute for type 347. At our Watervliet plant, S–816 alloy has been produced during the past 4 years. This alloy, in addition to cobalt, contains approximately 4 percent columbium. As mentioned in the discussion of cobalt, other alloys such as Waspalloy and M–252 have been developed more recently. These alloys contain no columbium and are, we understand, giving satisfactory service as blades in some jet aircraft engines.

The amount of tantalum in ferrocolumbium varies, and if the amount of tantalum is permitted to increase, greater quantities of ferrocolumbium are available to the industry. In many applications, experience has shown that the ferroalloys containing tantalum in an amount equal to approximately one-half of the columbium content is equally as satisfactory as the relatively low tantalum alloy that has been used over a longer period of time.

Senator MALONE. Does that complete your statement?

Mr. KING. That does, sir.

Senator MALONE. Your testimony is very interesting and informative to the committee.

Did you furnish a figure of the amounts of cobalt and columbium and tantalum that you use annually?

Mr. KING. Yes, we did.

Senator MALONE. As a total amount? You furnished the proportion. Could you give it in round numbers, just to sum up your testimony a bit—the amount of columbium and tantalum that you use annually in, say, 1952 and 1953?

Mr. KING. The peak year in cobalt is 1,658,000 pounds usage.

Senator MALONE. Is that 1953?

Mr. KING. 1951.

Senator MALONE. Then 1952 and 1953?

Mr. KING. 1,566,548 in 1952, and 1,287,413 in 1953.

Senator MALONE. This is cobalt?

Mr. KING. Yes.

Senator MALONE. Now could you give it to us for the same period for columbium and tantalum?

Mr. KING. Yes, I can give you these two figures, the first being the columbium in ferrocolumbium, where there is a modest amount or maybe a 5-percent maximum of tantalum.

Senator MALONE. This would be in columbium content.

Mr. KING. The peak year was 1950, 166,343 pounds. In 1951 it dropped to 70,219 pounds. In 1952, 17,500 pounds. In 1953, 27,950 pounds.

Senator MALONE. How do you estimate 1954, as an average year?

Mr. KING. We would think it probably would be equal to 1953.

Senator MALONE. Now tantalum.

Mr. KING. Now the ferrotantalum columbium.

Senator MALONE. That would be tantalum content.

Mr. KING. That contains 40 percent columbium and 20 percent tantalum. In other words, columbium plus tantalum is a minimum of 60 percent. There our usage in 1950 was 88,000 pounds; in 1951, 109,000 pounds; in 1952, 161,000 pounds; in 1953, 73,000 pounds.

Senator MALONE. And your estimate for this year would be about the same as in 1953?

Mr. KING. About the same as 1953.

Senator MALONE. Do you have any difficulty in securing these materials now at this time?

Mr. BITTNER. At the present time we have no difficulty and are able to obtain the amounts that our orders require.

Senator MALONE. What is the price, just in round numbers?

Mr. BITTNER. Cobalt?

Senator MALONE. Yes.

Mr. BITTNER. Cobalt is $2.60 a pound. Columbium, ferrocolumbium, is $6.40 a pound for columbium contained, and the ferrotantalum columbium is $4.75 for the columbium plus the tantalum contained.

Senator MALONE. And that proportion has already been given.

Mr. BITTNER. Sixty percent total of the two.

### PRECAUTIONS IN CASE OF AN EMERGENCY

Senator MALONE. What is your size-up of the situation that would happen if we suddenly became enmeshed in another emergency such as in 1950 or in 1941?

Mr. KING. I think, Senator, under those circumstances the allocations and, of course, control orders, would again be reinstated, and we would be allocated that amount of these alloying elements that the authorities in Washington decided we should have to make what they think is the most important.

Senator MALONE. Some of us have long believed that too much emphasis has been put on allocations instead of the emphasis being put on production in time.

With your knowledge of the supply and the amount utilized, what would you say the situation is and what could be done about it? I will ask this all-inclusive question, whether by price or Government activity in further production, taxes, or how could the additional supply be encouraged so as to take the onus off the rationing? We have time now—at least we think we have, and we want to utilize it.

Mr. KING. It seems to me, Senator, that from what knowledge we have as to the sources of these alloying elements, the supply under conditions of mobilization would be very limited. We know the demand would skyrocket for these high-temperature alloys. Unless there are available supplies in stockpile, it would seem to me that there would be a stringent shortage of these things.

Senator MALONE. We have other witnesses who have already furnished important testimony as to the prospects of increasing the supply in the Western Hemisphere. You heard the testimony, or at least heard it quoted, that perhaps the Western Hemisphere would be the only dependable supply. At the present time columbium principally comes from offshore areas across one or both major oceans, and would not be available in case of an all-out war.

You are in the business of using it. It has been my observation and experience with important companies that they look ahead to find out where their supplies will come from. Do you have any ideas that would be helpful to the committee concerning these particular materials?

The purport of all the testimony emphasizes that these materials are very important and in some cases, as you testified, they are absolutely indispensable.

Mr. KING. If there are sources that can be found in this hemisphere, even in, let us say, marginal deposits, they should be exploited, I think, because while we have substitutes, our job is to make the alloys that the engine builders, for instance, want to put in their product. In fact, some of these alloys I have referred to are alloys that have been developed, let us say "invented," by the engine builders. They have to have a product which will do a certain job. They tell us what the job is, and to the extent we can, we and they, too, devise the alloy for that job, and if that alloy requires an important alloying element, it seems to me there is no way to get around the necessity for it.

As I say, if new sources that are not subject to cutoff, not offshore sources but sources here, can be developed, it should be done.

### INFLUENCE OF PRICE OF COBALT AND COLUMBIUM ON FINISHED PRODUCT

Senator MALONE. You have quoted prices for all three of these elements, and they are rather substantial prices. How much influence does the price of columbium have on the finished product of an engine? What I am trying to get for the committee is how important it would be in the cost of the product, if cobalt were doubled in price? What would it mean in the price of an engine or the price of the product?

Mr. KING. It would certainly mean an increase in the price of the product.

Senator MALONE. How substantial for, say, a jet engine of—if you want to indicate the size of the engine?

Mr. KING. I don't believe I could even closely estimate that. I could calculate it. Possibly some of the engine builders who are here could give you a figure that would be more meaningful, knowing the quantities required to go into the engine.

Senator MALONE. I made a report to the Senate Military Affairs Committee during World War II on manganese and tungsten and other scarce materials. While manganese was very expensive, I tried to illustrate that the price was not very important relatively in a ton of steel, because it was a great deal like the soda in the biscuits. Whether it costs 10 cents a pound or a dollar a pound, it does not make much difference in the price of the biscuits.

If we could get some idea, it would then give us a place to put our feet in determining how far we could go in making recommendations. Could you estimate that part of it?

Mr. KING. I don't think it would be a meaningful figure to try to do it here. It could be done, and we would be glad to do it.

Senator MALONE. Mr. Thielemann, I am glad you stayed with us. I did not think to ask you this question. You have heard the testimony about the price of cobalt, of columbium, and of tantalum per pound. What the committee would like to know, for the purpose of a basis for study, for example—was it $6 a pound, Mr. King, for cobalt?

Mr. BITTNER. Cobalt is $2.60 a pound.

Senator MALONE. If you doubled the price of cobalt, what difference would it make in the price of the engine?

Mr. THIELEMANN. About $400, something like that.

Senator MALONE. What does the engine cost?

Mr. THIELEMANN. These big engines today are getting up over $100,000 per engine. So it is not a very big factor.

Senator MALONE. Then, if there is a possible chance of increasing the production of cobalt in the Western Hemisphere, and it would not be of great importance if you made the price to fit the cost of prospecting and mining, should we have an all-out war making our foreign sources of supply inaccessible.

Mr. THIELEMANN. Not as far as cobalt is concerned. I think it is so important that the cost is a very, very minor factor as far as cobalt is concerned. If it cost five times more than it does now, you still would have to have it.

Senator MALONE. And it still would pay off in the long run to find it in this hemisphere if it is possible?

Mr. THIELEMANN. We just have to have it, Senator, if we are going to build any quantities of these engines.

Senator MALONE. Now columbium. Your testimony was very interesting that you could produce jet engines without the columbium, but if you use the usual amount of columbium—and it was $6 a pound?

Mr. BITTNER. $6.40 a pound.

Senator MALONE. Suppose you doubled the price of columbium what would that mean in a $100,000 engine?

Mr. THIELEMANN. It would mean very little, because columbium in stainless steels is used in such small percentages it wouldn't mean much pricewise.

Senator MALONE. How much?

Mr. THIELEMANN. Suppose you used a thousand pounds of stainless per engine, and you had 1 percent columbium, that would be 10

pounds of columbium; and if you doubled or trebled the price, it would be $30 or $40 extra per engine.

Senator MALONE. Then it is similar to manganese. If you doubled the price of manganese and it put $2 on the price of steel, it would not amount to very much when you had to have steel, would it?

Mr. THIELEMANN. No.

Senator MALONE. I am just trying to get something for the committee.

Now, let us take tantalum. Is that in approximately the same category?

Mr. THIELEMANN. Tantalum, as a metal, is not used in the jet-engine industry. The reason tantalum has got into this picture is that in certain ores where columbium is found tantalum is present, too. Being able to use tantalum with the columbium gives you a larger overall availability of a stabilizing metal, which is columbium-tantalum, relatively 60 and 40. It is an availability thing and a cost factor. The separation of the two metals is, I understand, quite expensive if you had to separate the columbium from the columbium-tantalum ore. That is the only reason tantalum has entered into the jet-engine picture at all because it is found with columbite ore.

Senator MALONE. What does it cost per pound?

Mr. KING. $6.40.

Mr. BITTNER. Tantalum-columbium, $4.75.

Senator MALONE. If the price is $4.75, and if you did use it because the cost of separating it is too great, it still would not amount to anything in the price of a $100,000 engine or even a $10,000 engine.

Mr. THIELEMANN. No.

Senator MALONE. I think that is good.

We often quote prices and make illustrations for public consumption—I say "we"; Government departments are prone to do that—without explaining what it really means in the end product. So if the committee finally, through study of its testimony, decides that the metal would be unavailable outside of the Western Hemisphere, and it cost 3 or 4 times as much as an incentive price to find it, it still would not amount to anything in the end product. Is that what I understand to be the fact? That is correct, is it not, Mr. Thielemann?

Mr. THIELEMANN. Yes.

Senator MALONE. I think that is very helpful to the committee.

Does that conclude your testimony, Mr. King?

Mr. KING. Yes.

Senator MALONE. Do your associates have anything to offer?

Mr. KING. Not unless you have questions to them.

Senator MALONE. No further questions occur to me now. I think your testimony has been very helpful.

Your testimony will be furnished to you. If you think of any further information that would be helpful to the committee, you may edit it for completeness and accuracy.

Thank you very much.

Mr. KING. Thank you, Mr. Chairman.

Senator MALONE. The committee will stand in recess until 2 o'clock.

(Whereupon, at 12:45 p .m., the hearing was recessed until 2 p. m. of the same day.)

AFTER RECESS

Senator MALONE. The committee will be in order.

We have Mr. D. C. Goldberg, and Mr. George Duke, of Westinghouse Corp., aviation gas turbine division, Lester, Pa.

**STATEMENTS OF GEORGE L. DUKE, MANAGER, PURCHASING, AND D. C. GOLDBERG, MANAGER, METALLURGICAL ENGINEERING, AVIATION GAS TURBINE DIVISION, WESTINGHOUSE ELECTRIC CORP., SOUTH PHILADELPHIA, PA.**

Senator MALONE. Mr. Duke, we are very familiar with your organization, and we think it is one of the standard organizations of the country. We are glad to have you.

You and Mr. Goldberg may give the committee any information you think would be helpful in your own way.

Mr. DUKE. Thank you.

I am George L. Duke, manager, purchasing, Westinghouse gas turbine division, of Philadelphia; and with me is Mr. D. C. Goldberg, manager, metallurgical engineering for the gas turbine division.

I would like to talk a little bit about Westinghouse requirements for these materials as an overall picture, Senator, and then turn the discussion over to Mr. Goldberg and ask him to talk in more detail about our jet-engine requirements.

Senator MALONE. That will be perfectly satisfactory. Go right ahead.

USAGE OF RUTILE

Mr. DUKE. On our use of these materials as mentioned in the telegram, the first I would like to discuss is rutile. This is the biggest item going into the makeup of welding-rod material outside of the steel electrode itself. The coating, which contains a high percentage of titanium dioxide, is a definite requirement for the operation of the Trafford welding works, of Westinghouse, and as of this writing we know of no substitute to replace this coating.

Within the company itself, at the present time we are using approximately 100,000 pounds of rutile per month, of a dollar value of approximately $75,000 per year.

During periods of national emergency the quantity would go up perhaps 50 percent.

Senator MALONE. Would you at this point define what you mean by a certain number of pounds of rutile? Is it contained in a certain metal, or describe it so it will be clear to the committee.

Mr. DUKE. Maybe Mr. Goldberg can help me out on that.

Mr. GOLDBERG. It is a mineral containing a large percentage of titanium which is used as a coating for welding electrodes.

Senator MALONE. Is this contained titanium that you are talking about?

Mr. GOLDBERG. Titanium dioxide, yes, sir.

Mr. DUKE. It is expected that the new facility which we are now building will probably increase our consumption of this material substantially, although exactly how much we are not prepared to say at this time.

This is not specifically tied in with any defense contract, but it is apparent that welding electrodes, particularly coated electrodes, are fundamental to high production of all types of welding apparatus.

The next subject I would like to discuss is cobalt.

Senator MALONE. Before we leave the rutile, what is the source of this rutile that you have been securing?

Mr. DUKE. We have bought this material from the Foote Mineral Co., Philadelphia, Pa., and Titanium Alloys Metal Co., a division of National Lead.

Senator MALONE. Do you know where they get it?

Mr. DUKE. Foote Mineral Co. imports the material from Australia. Titanium Alloys Metal Co. secures the material in two ways, based on price. If the price from Australia is such that the cost of securing the material in Florida from open excavation is competitive, they use the Florida source. Otherwise, they import the material from Australia. Since this arrangement doesn't lead to a satisfactory assurance of supply, we will probably secure most of our requirements in 1954 from Foote Mineral Co.

Senator MALONE. Do you know anything about the available supply?

Mr. DUKE. All I know is that at the present time we are having no difficulty procuring our requirements, and that the Australia deposits are much larger than our Florida deposits.

Senator MALONE. Go ahead.

### USAGE OF COBALT

Mr. DUKE. The use of cobalt is limited at the present time to our East Pittsburgh works as a raw material, and to our gas turbine division in Kansas City as a raw material and as an alloyed material, and South Philadelphia as an alloyed material.

East Pittsburgh uses cobalt in the manufacture of some trade materials which we call Kovar, K–42B and Refractaloy and Hiperco. These are Westinghouse materials. East Pittsburgh also uses cobalt in the manufacture of Stellite 31.

Senator MALONE. Right at that point, before we get too far away from rutile, I would like to ask you if you know anything about the substitutes for rutile?

Mr. DUKE. I made a comment, I believe, in the remarks that as yet we have no known substitutes for this particular application.

Senator MALONE. The ilmenite containing titanium is not a substitute as you understand it?

Mr. DUKE. Pardon me, sir?

Senator MALONE. The ilmenite ore that contains titanium could not be made a substitute for rutile. Is that the way you understand it?

Mr. DUKE. The ilmenite is not suitable as a substitute for our welding-rod material. The only known substitute which has been used in a limited way during shortages is tanarc, an alloy with a high titanium content which is manufactured by Foote Mineral Co. Going back to our cobalt, in Kovar the cobalt is used primarily to take advantage of its thermal expansion coefficient and its wetting characteristics on glass. In the two other alloys, cobalt is used to increase their high-temperature properties. I think I can disclose these quantities without per-

haps divulging any classified information, because the use is so general that it would not apply to any particular defense contract.

Senator MALONE. You are talking only about your own use?

Mr. DUKE. That is right, sir.

During 1953 our east Pittsburgh works consumed some 150,000 pounds of cobalt. It was divided roughly 67 percent in the manufacture of Kovar, 25 percent for K42–B and 5 percent for Refractaloy, 3 percent of stellite shot and hiperco. During 1953 our Kansas City works consumed 32,000 pounds of cobalt in the manufacture of alloys for jet-engine turbine blading. The cobalt material which is being used at east Pittsburgh and Kansas City is being purchased from the African Metals Co., 25 Broad Street, New York, and the origin of this is the Belgian Congo.

The K–42B, Stellite 31, and the Refractaloy can be considered as defense products, as their end use is for our gas turbine division and our steam division, among other uses.

Those are the only comments I have on cobalt as far as its general use. Perhaps Mr. Goldberg would like to add something to that.

Senator MALONE. What is the purpose of the use of the cobalt in your particular product?

Mr. DUKE. In Kovar it is used to obtain the same expansion characteristics as glass.

Senator MALONE. Explain Kovar. Just what is it?

Mr. DUKE. Kovar is the Westinghouse trade name mark of a metal having the same expansion characteristics as glass.

Mr. GOLDBERG. Kovar contains 18 percent cobalt, 28 percent nickel, 54 percent iron.

Mr. DUKE. Its benefit is in this expansion coefficient and its wetting characteristics on glass. That is the important use of it.

Senator MALONE. You know nothing about the actual or potential supply of cobalt. All you know is that you are getting what you need now?

Mr. DUKE. We know that cobalt is found in the Belgian Congo, Canada, Cuba, and in the United States in the regions of Cornwall, Pa., Fredericktown, Mo., and Blackbird, Idaho. Canada has reserves of recoverable cobalt of approximately 250 million pounds and the Belgian Congo has reserves estimated at 40 years at the rate of 9.5 to 10 million pounds per year. The known United States deposit estimates seem insignificant by comparison to the Belgian Congo. Cuba and the United States deposits have only recently been developed and the Belgian Congo is supplying about 90 percent of the United States requirement. The United States consumption for 1952 was estimated at 14,500,000 pounds.

Senator MALONE. There is no substitute, as far as you know, in the use that you make of it?

Mr. DUKE. That is correct.

### USAGE OF COLUMBIUM

On columbium, columbium as ferrocolumbium is used in various raw materials as an alloying agent to increase their high-temperature properties. Our east Pittsburgh works uses columbium at the rate of 1,000 to 1,500 pounds per year, primarily as an alloying element in

our foundry to give special characteristics to our foundry products.

The steam and aviation gas turbine divisions of Westinghouse are at the present time buying forgings and castings which contain columbium for end usage in the high-presure end of their turbines and for high-temperature blading.

As Mr. Goldberg will cover, I believe in some detail, the use of columbium in our jet engines, I will not cover that.

Our use of columbium is very small except for our use in jet engines.

### USAGE OF TANTALUM

On tantalum, our Elmira works, which is our tube division, electronic tube division, use tantalum on a limited basis in some 12 different types of power tubes in which limited amounts of tantalum in the form of strip, wire, or rod are used.

Although to a limited degree tantalum could be successfully substituted by molybdenum, it is still a must for certain applications in specific types of power tubes.

The main reason for tantalum being used is because of its extremely high-melting point, 2,850° C. Some of these tubes go into defense products.

Our main source of supply of tantalum is the Fansteel Metallurgical Corp.

Senator MALONE. You do not know where they get it or anything about the potential supply?

Mr. DUKE. The United States produces less than 1 percent of our requirements from deposits in South Dakota, North Carolina, Arizona, and Colorado.

The primary sources for tantalum are the Belgian Congo and Brazil. It is our understanding that the Government now imports all tantalum and that Fansteel Metallurgical Corp. buys tantalum from the Government stockpiles.

During 1953, Westinghouse used approximately 1,000 pounds of this metal, and during 1954 we expect it to be about the same.

The only other comment I could make with regard to the general uses is that columbium and tantalum are used to some extent by our Atomic Power Division, but the quantities there I am not sure should be given out.

I think Mr. Goldberg can speak more specifically, possibly, about our jet-engine operation.

Senator MALONE. Mr. Goldberg?

### EFFORTS TO ELIMINATE CRITICAL ALLOYING ELEMENTS IN JET ENGINES

Mr. GOLDBERG. As with the other engine manufacturers, the aviation gas turbine division was given a contract in 1951 to reduce critical alloying elements in our engines. The Bureau of Aeronautics, realizing that there would be a shortage of elements such as columbium, cobalt, tungsten, nickel, chromium, allowed this contract to be placed with Westinghouse to see in what way and by what methods the consumption of these elements could be curtailed and used in the most efficient manner.

Speaking of columbium, in our engines we include tantalum. Almost all of the columbium that is used does contain a certain percentage of tantalum.

Senator MALONE. It was explained this morning that the use of tantalum in a general way was because it was a little bit hard to separate from the columbium. Is that the reason you use it?

Mr. GOLDBERG. That is correct.

Senator MALONE. Go ahead. It has no particular significance of itself?

Mr. GOLDBERG. It has no significance one way or another. It is there and we use it.

In this contract, as part of its requirement we were not to sacrifice either durability or reliability of the engine in making these alloy reductions. That was a "must" part of the contract.

Since 1951 the use of columbium has been drastically reduced in all of our gas turbine engines that we are presently making. Of the 3 models, 1 of which is the J–34, the only columbium being used is in the form of welding electrodes.

Senator MALONE. That is a jet engine?

Mr. GOLDBERG. Yes.

Senator MALONE. What amount of columbium do you use per engine of a certain size that you make? Could you estimate that?

Mr. GOLDBERG. Just a rough figure, not caring to go into the details, under 1 percent of the total critical elements involved in the entire engine.

Senator MALONE. Let us assume an engine weight. What is the weight of one of your engines?

Mr. GOLDBERG. Say on the order of 2,000 pounds.

Senator MALONE. Suppose the engine weighed 2,000 pounds, how many pounds of columbium would there be in it, under your procedure?

Mr. GOLDBERG. At the present time it would be well under 5 pounds.

Senator MALONE. What price do you pay for it?

Mr. DUKE. Ferrocolumbium itself is presently priced at $6.45 per pound for contained columbium. We buy a steel alloy containing a small percentage of columbium and the cost of the columbium is reflected in the price for the entire alloy. It shows up as a very small percentage of the cost.

Senator MALONE. Then the price of the columbium really makes no difference except to get it at as low a price as feasible, but as far as the price of the finished product, the end product, it does not make much difference.

Mr. DUKE. That is correct.

Mr. GOLDBERG. Our efforts in eliminating cobalt from our engines have not had as significant results as with columbium. We have had more trouble in eliminating cobalt. This is mainly because the alloy that we are using for our turbine blading is the hot end of the engine has to withstand high temperatures and high stresses, and since Westinghouse favors a cast type of turbine blade, we have been unable to develop a nickel blade that is equal to the cobalt base blade we are using.

However, in the cooler end of the hot end of the turbine, the second stage of the turbine, we have been able to substitute a nickel base alloy for both the rotating element and the stationary elements, which is part of this general effort to reduce the specific alloy content.

Savings that we have been able to achieve have been on the order of, say, 60 percent over what we had used in 1951.

Senator MALONE. Then the only idea of saving it is because of its scarcity. If it were available, the cost would not mean anything to you?

Mr. GOLDBERG. No, the cost isn't too much of a factor in this case. We are looking for alloys which will allow us to operate with high performance and greater durability and reliability.

In conclusion, although, as I have pointed out here, we can build our engines without making full use of columbium or cobalt, we do feel that there should be a strong effort to secure as much as possible in case of national emergency. As Mr. Badger pointed out earlier, reducing the amount of cobalt used means increasing the amount of nickel. When you go through a period as we have recently, securing supplies of nickel becomes as critical as securing the cobalt.

Senator MALONE. In what proportion is one substituted for the other?

Mr. GOLDBERG. I don't think there can be a direct substitution. Equivalent alloys can be developed, though, in the same range.

Senator MALONE. Working on the same basis as an illustration, a 2,000-pound engine, how many pounds of cobalt would be in this engine?

Mr. GOLDBERG. On the order of 100 pounds or less.

Senator MALONE. Say 100 pounds out of 2,000 pounds—about 5 percent?

Mr. GOLDBERG. Somewhat like that.

Senator MALONE. What do you pay a pound?

Mr. GOLDBERG. In the form of rondelle it is purchased at $2.60 a pound.

Senator MALONE. Then if it doubled in price, it would be somewhere around $200 or $240 more. What is the price of the engine?

Mr. GOLDBERG. It would vary. The point to remember——

Senator MALONE. For the 2,000 pound jet engine that you used for illustration, what range is the price?

Mr. GOLDBERG. On the order of $60,000.

Senator MALONE. $60,000. Two hundred and fifty dollars, if it doubled in price, would be the maximum difference.

Mr. GOLDBERG. The point to remember on the use of cobalt—there are several steps it has to go through. Take the rondelle and turn that into a prealloy, say stellite 31 shot, which happens to be the alloy in question. Then that is remelted into the form of a blade, and the price goes up fairly high per unit. The price starts multiplying when you end up with the final product.

Senator MALONE. It does not make any difference what the original price is, you have to go through the processing cycle.

Mr. GOLDBERG. That is right. There is a certain base cost.

Senator MALONE. So the base price for cobalt is not significant in the price of the engine?

Mr. GOLDBERG. No; it is not.

Senator MALONE. Go ahead.

Mr. GOLDBERG. I know in the case of the columbium-stabilized stainless steels, up until recently, we tried not to use it in order to conserve columbium. However, recently, as was pointed out earlier also, the suppliers are more in favor of using columbium-stabilized steels to reduce scrap rate at all points along the line. We are using some amounts of it on material deviations.

Senator MALONE. Do you mean there is less scrap in the steel when you are working it if it is made in the regular way with columbium than with a substitute.

Mr. GOLDBERG. We have noticed that in purchasing small quantities where you can't take advantage of the best manufacturing techniques.

Senator MALONE. What do you mean by that?

Mr. GOLDBERG. Say you want to make a ring, there are several ways of making it. You can forge it, roll it, or take a strip and flash butt weld it. Each one of these methods works the metal in varying degrees. On an order for a small quantity, it would be more advantageous to buy forgings than welded or rolled rings. However, more difficulty is encountered in manufacturing rings by any of these processes using a noncolumbium bearing steel with the greatest difficulty encountered when forging this material.

Senator MALONE. I understand. I thought you meant a small order in buying. What you mean is a small order in making the end product.

Mr. GOLDBERG. Yes.

Senator MALONE. I do not think of any more questions at this time. Thank you very much for your presence here.

Mr. DUKE. Thank you very much.

Senator MALONE. Mr. A. W. F. Green of the General Motors Corp., Allison division, Indianapolis, Ind.

Mr. Green, you have listened to the testimony and are familiar with the objectives of the subcommittee, and you may proceed in your own way with any information you think would be helpful to us.

## STATEMENT OF ARTHUR W. F. GREEN, CHIEF METALLURGIST, ALLISON DIVISION, GENERAL MOTORS CORP., INDIANAPOLIS, IND.

Mr. GREEN. I am Arthur W. F. Green, chief metallurgist of the Allison division of the General Motors Corp., Indianapolis, Ind.

Senator MALONE. You are another standard corporation that we expect a lot out of when you start to do anything.

Mr. GREEN. We had the privilege last week, or within the last 10 days, of turning over to the armed services the 25,000th turbojet engine that we had manufactured. At that same time was were able to state that our engines have had in excess of 2½ million flying hours.

Senator MALONE. This is all of these engines taken together?

Mr. GREEN. That is all of the engines collectively.

Out of that has come a rather large experience in material utilization, longevity, replacement parts, and general manufacturing that goes with it.

An astounding thing about the studies made in conjunction with this 25,000th engine was the fact that up until about 2 years ago, most of the engines that had been made contained basically the same alloys, which included sizable amounts of cobalt and columbium, that we started to use 9 years ago in our manufacturing program. At that time we were very fortunate to have a 4- to 5-hour flight engine life. Today the flight life, in some cases under actual combat conditions, has exceeded 1,000 hours without major overhaul.

Without changing the materials there are, therefore, definite reflections of material savings by longevity, better design, better manufacture, and overall know-how.

I understand fully that many of these statements are like the stuck needle on the disc, because you have heard them previously, but nevertheless they are factual.

### REPLACEMENT PROGRAM FOR ALLOYING ELEMENTS

In the manufacturing history and in conjunction with the knowledge gained in World War I and in World War II, that certain materials, especially the offshore types, could be in restricted supply and not readily available, we started over 6 years ago an intense research program aimed to determine what could be done to replace columbium, columbium-tantalum, and cobalt, particularly those two and like the testimony of Badger, Thielemann, Hanink and Goldberg, we ended up with hitting the nickel pile very hard.

We, too, enjoyed the development of a strategic materials engine program which we carried to a rather successful conclusion, where we cut the number of poundage of strategic alloys almost in half. Not only did we make the engines produce the same relative thrust output at approximately the same relative weight as the engine from which it took its being, but there are actual engines of that type in airplane flight today and being given flight testing.

Out of that program has come the fact that we have definitely cut down the use of columbium, either as columbium or columbium-tantalum, keeping in mind that we at Allison do not manufacture any of the materials from their inception. We buy the castings, forgings or other wrought form products and fabricate therefrom.

We have been able to cut down the use of columbium and tantalum in some instances almost 100 percent in some components.

Senator MALONE. Let me ask you again, so it is clear in the record: You called it columbium-tantalum, but you only use the tantalum because you cannot get rid of it at a reasonable price? Or does it have some kind of an effect on your alloy?

Mr. GREEN. It has no apparent deleterious effect on the use of columbium in so far as it has made available a greater supply of ferrocolumbium with a known amount of tantalum.

Senator MALONE. What part does tantalum play? I want to get to the bottom of it before I get through.

Mr. GREEN. So far as I can see, sir, it acts very much as does the columbium, as a stabilized of carbon in the metal.

Senator MALONE. You are the first one who said it had any value. They said they just used it because it was hard or expensive to get rid of it.

Mr. GREEN. It is hard to get rid of, but since it is there we also have had to know whether it would not act in the wrong direction. Since it doesn't, we can assume that it acts very much in conjunction and in a very collaborative way with columbium.

Senator MALONE. Suppose you got rid of it and went through the expense of that, then you would have to have that much more columbium?

Mr. GREEN. Definitely, sir, if you continued to use ferrocolumbium, as was brought out in your earlier testimony this morning, sir.

Senator MALONE. Somehow I missed it, but I want to get it clear now in your testimony that columbium-tantalum combination both have a like effect, and if you did get rid of the tantalum or the tantalum was not in it to start with, you would have to use for columbium?

Mr. GREEN. That is correct.

Senator MALONE. You are the first one who told me that. I just kept pounding at it.

Go ahead.

Mr. GREEN. I am glad you brought it out, sir, so there is no misunderstanding.

The second thing, then, was where and why do we persist in continuing to order columbium-bearing material, particularly the 18–8 series, in certain of the hot-end components of our engines.

Senator MALONE. There is another thing I was interested in in your opening statement. Were you making engines for World War I airplanes?

Mr. GREEN. In World War I, sir, I wasn't making engines, but I did help to make guns and armor.

Senator MALONE. You spoke of lessons learned about materiel availability in World War I. That was my war, and we had one plane per battery, and as far as I could see they were not fit to send a pet cat up in, but we did send men up in them.

Mr. GREEN. I can assure you, sir, that I was not part or parcel of it. The only thing I ever contributed to any of those single airplanes, sir, was that we made a better Browning machinegun. We really tried to make it have some armament.

Senator MALONE. I saw that, too. Now go ahead with your testimony.

Mr. GREEN. I think that is wonderful.

We cut back on this basis the use of columbium-tantalum bearing 347 alloy, that is the 18–8 type, by restricting its use only to those components which in the operation of the engine required welding to make the component and were going to be used at temperatures in excess of 800° Fahrenheit. Such components that did not require welding we believe can do as good a job using the so-called 18–8 with the titanium addition instead of columbium-tantalum, and are using quantities for it, as for example many stud parts.

Insofar as those components that require only corrosion resistance and do not exceed 800° Fahrenheit, in order to get some better stabilization of welding properties we are using the 18–i with titanium, and we are also using or are trying to use the so-called low-carbon 18–8, where carbon is maximum 0.03.

Frankly, we have had some difficulty with this material, in that even though it may come from the melting furnace with 0.02 or 0.03 maximum carbon, by the time we get it in final wrought form it has picked up sufficient carbon on the surfaces as to negative its effect insofar as carbide precipitations may be concerned, having had actual cases where it picked up as much as 0.05 carbon and we got very bad carbide segregation as a result.

We also learned in the development of the strategic materials engine that we could completely replace some of the chromium and the nickel steels by resorting to coatings of various types, including aluminum.

I have one instance here where one engine is now being made in production, where 1 year ago the so-called aft-frame construction of that engine, which weighs approximately 390 pounds, was made entirely of 18–8 chromium nickel steel with titanium, is today being made entirely of an aluminum-coated steel, and we use practically no alloy. There is about 0.1 to 0.15 percent molybdenum only in the base metal.

So there are these possibilities of segregation.

Insofar as the supplanting of cobalt is concerned, we have run into a few snags in the after-burner part of the engine. We have not been able to replace a cobalt-bearing material which also contains some columbium in the form of columbium-tantalum successfully and still meet our after-burner temperature requirements. So far as turbine buckets may be concerned, our 6½ years of research effort have now started to pay off, and we have in production engines today, where the turbine buckets are cast to shape, which means first that we recover more pieces per pound of added metal to the pot than we would by any wrought form.

Secondly, there is no cobalt used. There is no columbium-tantalum, none whatever. That material is showing excellent physical properties and rather good longevity.

We are of the opinion that we can supplant cobalt in the after-burner parts with a little more practice and a little more design technique.

Senator MALONE. This engine you describe—is this a hot engine?

Mr. GREEN. Yes, sir.

Senator MALONE. A jet?

Mr. GREEN. Yes, sir.

Senator MALONE. How much does it weigh?

Mr. GREEN. Approximately 4,000 pounds. If we take all of the turbine buckets out that contain the cobalt and the columbium, we will take out 4 pounds of columbium from the engine alone by replacing it with this other material. We take out all of the cobalt.

Senator MALONE. Apparently it is satisfactory in that manner?

Mr. GREEN. In fact, it is superior to the material we had been using insofar as its indicated properties at elevated temperature may be concerned.

Senator MALONE. What is the material?

Mr. GREEN. It is a nickel base material containing titanium and aluminum and molybdenum.

Senator MALONE. Entirely free of columbium?

Mr. GREEN. Yes, sir, and cobalt.

Senator MALONE. Then you can make such an engine without any columbium or cobalt? Is that right?

Mr. GREEN. There is a possibility, sir—and we are working on that possibility—of eradicating the cobalt from the after burner sections. We haven't been too successful as yet, but we may be able to attain that. The average time that it takes for the average engine builder to make a changeover, sir, isn't too often well understood, but it actually figures out an average of about 4 years' time of design and testing before we get to a production engine.

Senator MALONE. Go ahead.

NECESSITY OF COLUMBIUM AND COBALT

Mr. GREEN. I think, sir, that I have made as great a contribution as I can by simply tell you that those are our feelings as we are now constituted. We do need cobalt, we do need some columbium in the form of columbium-tantalum, preferably not the separated type. We believe that they have definite places in the engine service.

There is one additional point only, and that is that it is possible that even though we have an alloy today without cobalt, without columbium-tantalum, that with slight modification of that alloy we might increase its life at the same stress levels by slight additions of columbium or cobalt, or both; but as it now stands, sir, that is research.

Senator MALONE. Do you have any knowledge of what Russia is doing in regard to this type of equipment?

Mr. GREEN. The only knowledge that I have, sir, would indicate that they are using columbium and columbium-tantalum materials. They are using nickel-bearing materials, and they are using cobalt base materials in the hot ends of their engines.

Senator MALONE. They probably are right along the same lines that we are operating, is that true?

Mr. GREEN. I wouldn't be surprised, sir. There is everything to indicate it, yes, sir.

Senator MALONE. They had these German scientists and engineers——

Mr. GREEN. And they also have available certain deposits which we have every reason to believe they have been able to utilize.

Senator MALONE. Rather extensive cobalt and columbium deposits?

Mr. GREEN. I am not so sure of the extent of the cobalt, but it would appear that there may be cobalt hidden in the Ural areas.

Senator MALONE. Do you have any further statement?

Mr. GREEN. No, sir.

Senator MALONE. I believe that is all, then, Mr. Green. You will be furnished your testimony to check for accuracy and completeness and then sent back to us.

That completes the list of the industrialists mentioned.

From the Bureau of Mines we have Mr. Mitchell Kline, who is the Chief of the Rare and Precious Metals Branch, and Mr. R. G. Knickerbocker; and we have Mr. Edward P. Kaiser, of the Geological Survey. If you three men will come forward, please.

Mr. Blue, you are in that field. Why don't you come up with them.

BUREAU OF MINES

**STATEMENTS OF MITCHELL KLINE, CHIEF, RARE AND PRECIOUS METALS BRANCH; DELWIN D. BLUE, ASSISTANT CHIEF, LIGHT METALS BRANCH; OLIVER C. RALSTON, CHIEF METALLURGIST, WASHINGTON, D. C.; AND R. G. KNICKERBOCKER, CHIEF, MINERALS TECHNOLOGY DIVISION, REGION VI, ROLLA, MO.**

GEOLOGICAL SURVEY

**STATEMENT OF EDWARD P. KAISER, DENVER, COLO.**

GENERAL SERVICES ADMINISTRATION, MATERIALS DIVISION

**STATEMENTS OF IRVING GUMBEL, ACTING DIRECTOR; ALBERT H. GREEN, ATTORNEY; AND R. E. WILSON, PERRY MOORE, AND V. A. BRUSSOLO, MINING ENGINEERS**

Senator MALONE. Mr. Kline, I have asked you all to come up together because you are concerned with the same general field, and if there is anyone else you would like to have come up to the table, it will be your responsibility. Just take charge of it, make your own statement, and use your assistants in any way you see fit.

You have been before the committee before, Mr. Kline, and you are entirely familiar with what we are trying to do. You have been most helpful. We have called you today because we consider you in the nature of a cleanup man on this business.

You have heard the testimony of the industrialists, which has been very interesting to the chairman. If you have any statement to make, you may proceed in your own way, and any of your associates may chime in at any time.

Mr. Ralston and Mr. Mittendorf, would you like to sit over here at the table?

The chairman, speaking for himself, anyway, and I think for the committee, considers you men in the nature of consultants to the committee.

Mr. KLINE. And a very good panel of consultants, too.

If I may, I would like to start off by a very brief summary of the supply and demand picture, which may fill in certain parts of the gap.

SUPPLY AND DEMAND OF COLUMBIUM AND TANTALUM

Senator MALONE. This is columbium?

Mr. KLINE. Columbium and tantalum.

Senator MALONE. I am going to ask you to clarify the use of columbium and tantalum together, too. It is a little confusing in my mind yet.

Mr. KLINE. We will be glad to as we go along.

Less than 1 percent of the United States columbium-tantalum requirements is produced from domestic mines.

Senator MALONE. That is in the United States proper?

Mr. KLINE. That is correct. Nigeria and Belgian Congo currently furnish about 80 percent of our total supply. As a result of the Government incentive bonus purchase program, columbite-tantalite imports in 1953 equaled the previous peak year (1945) and more than doubled 1952 imports. The metallic content of columbium-tantalum-bearing tin slag imports in 1953 was 50 percent higher than in 1952; however, a large quantity of these tin slags was very low grade and cannot be utilized by extractive processes now in use. Total new supply of available combined metal in 1953 was approximately 3.8 million pounds, of which about 10,000 pounds was from domestic mines. Of this 3.8 million pounds of available new metal, less than 250,000 pounds of metallic tantalum can be produced by extractive processes now in use.

Tantalum supply is a much more serious problem than is columbium. As a result of new discoveries and recent developments in metallurgy, domestic production is expected to increase greatly. Planned production from the Bear Valley deposit, Idaho, could supply 25 percent of our current consumption. Known reserves are large. Other interesting placer deposits are known on tributaries of the Boise, Salmon, and Deadwood Rivers of Idaho.

Senator MALONE. Do I understand you to say they are now producing 25 percent?

Mr. KLINE. No; I said it could. It is capable of producing it.

Senator MALONE. And the reserves seem adequate to keep that up for a considerable time?

Mr. KLINE. Certainly 10 or 20 years, depending upon the rate at which it is worked.

Senator MALONE. Twenty years in sight?

Mr. KLINE. Yes.

Senator MALONE. That does not mean that further development would not uncover further reserves?

Mr. KLINE. Probably not in Bear Valley itself. I think that will be approximately the limit.

Large reserves of columbium are known to occur in the bauxite deposits of Arkansas and the titanium mineral deposits of the Magnet Cove area. Placed deposits of the southeastern States may be a potential reserve. These reserves in Arkansas and the southeastern States are valueless, however, unless the columbium can be extracted economically.

Senator MALONE. What do you mean by "economically"?

Mr. KLINE. At a profit.

Senator MALONE. At a profit where?

Mr. KLINE. At a profit in the United States.

Senator MALONE. Compared to what?

Mr. KLINE. The reason I say "at a profit" instead of giving you a definite figure is that with our fluctuating price schedule, there is no such thing as a definite price.

Senator MALONE. What do you compare it to? If you have production in the United States at a certain price, what would you compare it to and what would you be competing with in the matter of profit?

Mr. KLINE. To operate at a profit the man producing the ore and metal must be able to meet expenses and still make a living.

Senator MALONE. What determines the price of columbium?

Mr. KLINE. Presently the price is established by the ODM or DMPA.

Senator MALONE. What is their criteria?

Mr. KLINE. I think it is based upon the idea that if the price is high enough it will bring into production certain marginal ores. The exact criteria could probably best be furnished by the representatives of that organization who are here.

Senator MALONE. Who are they?

Mr. ADLERMAN. Is that ODM, did you say?

Mr. KLINE. Yes, their Emergency Procurement Service.

Senator MALONE. What does ODM stand for?

Mr. KLINE. Office of Defense Mobilization.

Senator MALONE. I wish you fellows would use the words.

Who is here representing the ODM?

Mr. WEAVER. We are, Senator. I would like to bring up Dr. Morgan and Mr. Curtis.

Senator MALONE. Yes, and please identify yourself for the record.

Mr. WEAVER. My name is Elmer H. Weaver, Assistant Director, Office of Defense Mobilization, for Materials.

This is Dr. John D. Morgan, mining engineer, and special assistant to me.

This is Mr. Tom Curtis, Chief of the Ferroalloy Division of our organization.

PRICE DETERMINATION FOR COLUMBIUM

Senator MALONE. Now I want to ask you this question: How is the price fixed for columbium?

Mr. WEAVER. The price is negotiated by the Emergency Procurement Service of GSA. I think it would be well to have those gentlemen up here, too.

Senator MALONE. What is that now? What office?

Mr. WEAVER. Emergency Procurement Service of the General Services Administration.

Senator MALONE. Just move up en masse here.

Will one of you identify yourself and introduce your associates?

Mr. GREENE. I am Albert H. Greene, Emergency Procurement Service, formerly DMPA.

This is Mr. Perry Moore, Emergency Procurement Service; Mr. R. E. Wilson, and Mr. Brussolo.

Senator MALONE. I will ask this question again: The committee is very much concerned with the scarcity of these materials, and naturally they need to know why they are scarce. There never has been a record in this Nation of anything being scarce very long if anybody could make a profit. They found it someplace. If not in this Nation, they found it someplace else and got it here.

How do you set the price of columbium, and what is the price?

Mr. GREENE. If I may, Senator, when the requirements were set by the Office of Defense Mobilization about 18 months ago, as I recall it, on columbium-tantalum the officials of DMPA got together and decided or thought the best way of bringing into this country or producing domestically more columbium, more tantalum, and more columbium-tantalum. Mr. Young was then the Deputy Administrator.

Senator MALONE. Who is he?

Mr. GREENE. Howard I. Young, who was then the Deputy Administrator.

Senator MALONE. Where was he from?

Mr. GREENE. He was on loan or on leave of absence from the American Zinc Co. of Illinois.

Senator MALONE. Go ahead.

Mr. GREENE. He is also president of the American Mining Congress. He and the engineers of DMPA decided that, in their opinion, they would pay 100 percent premium on top of the world price for any columbium-tantalum coming in, either being produced domestically or internationally.

We then, on that basis, set into motion an open purchasing program.

Senator MALONE. Let me get this straight. There was a world price?

Mr. GREENE. That is right, sir.

Senator MALONE. What was the world price?

Mr. GREENE. I don't recall. Probably Mr. Moore knows that.

Mr. MOORE. Around $2, average. It depends upon the grade of the ore, of course. Around $2 average.

Senator MALONE. Is that $2 a pound contained columbium?

Mr. MOORE. Contained oxides, the two pentoxides, $Cb_2O_5$ and $Ta_2O_5$, the sum of those two.

Senator MALONE. Was there any of this material being produced at that price to amount to anything?

Mr. GREENE. Yes, sir. There was what had been produced heretofore, but the requirements were so much greater——

Senator MALONE. Do you know how much the world production was at that time?

Mr. MOORE. I believe Mr. Kline knows that.

Senator MALONE. When was this?

Mr. MOORE. Early 1952.

Mr. KLINE. Early 1952.

Senator MALONE. What was the world production in, say 1951?

Mr. KLINE. I don't have that for 1951.

Senator MALONE. Will someone get that production?

Mr. GREENE. We may have the figures here, sir.

Senator MALONE. Let us get those for 1950 and 1951. I want to find out for the benefit of the record, first, what was the world price based on in production and use, and what you based your price upon. You say you doubled the world price.

Mr. GREENE. That is right.

Senator MALONE. Let's find out about it.

Mr. GREENE. Perhaps I should correct myself. We paid a 100 percent bonus on the world price.

Senator MALONE. There was no distinction between domestic production and foreign production, just so you got the ore?

Mr. GREENE. That is right, sir.

Senator MALONE. I might ask you at this point, why was there not some kind of recognition of higher-cost production in this country than in foreign nations?

Mr. GREENE. My recollection of that, sir, was that at the time the requirements came over, they were so much greater than the known world supply that the officials of DMPA, also knowing that so little

of it was being produced in this country, felt that the best way to bring the ore out, wherever it was located, was to give a money incentive.

Senator MALONE. Where were you getting this ore from foreign imports? Where was it available?

Mr. MOORE. The bulk of it was from Africa.

Senator MALONE. And Nigeria?

Mr. MOORE. Nigeria and Belgian Congo.

Senator MALONE. What were the wages paid there?

Mr. MOORE. I don't know, sir.

Senator MALONE. Don't you ever look those things up?

Mr. MOORE. I haven't happened to, no.

Senator MALONE. Did you, Mr. Greene?

Mr. GREENE. No. I don't know.

Senator MALONE. You did not know anything about the wages paid there when you fixed the price for domestic and world production?

Mr. GREENE. I can't answer that, Senator. I would like to correct the record. I didn't fix the price. Mr. Young and the engineering officials of DMPA fixed the price.

Senator MALONE. Are the engineering officials here?

Mr. GREENE. No, sir.

Senator MALONE. Who are they?

Mr. MOORE. Mr. Stott and Mr. Young.

Mr. GREENE. And Mr. Stan Keith.

Mr. MOORE. Mr. Bourret.

Senator MALONE. Who are these people?

Mr. MOORE. Tom Lyon was Director of the Production Expansion Division. He has now resigned. Young was the Deputy Administrator of DMPA. Mr. Young already has been identified as Howard I. Young. Tom Lyon was a former International Smelting & Refining Co. general manager, Salt Lake office. And Weston Bourret was a geologist with Kennecott Copper Co.

Senator MALONE. Is he back with his outfit now?

Mr. MOORE. Yes. He is with the Utah Construction Co.

Senator MALONE. Tell me, is there anyone still with your outfit that fixed this price?

Mr. GREENE. I would say no, sir.

Mr. MOORE. I don't believe there is.

Senator MALONE. How come you fellows knew nothing about it? You do not work together?

Mr. GREENE. We do work together, but we weren't in a position to set policy.

Mr. Irving Gumbel, who wasn't with the organization at that time, is the only one now who sets policy.

Senator MALONE. Is Mr. Gumbel here?

Mr. GREENE. No, he is not here. But there is nobody left from the former DMPA who was in a policy position or who sat in at these meetings.

Senator MALONE. Do you know anything about the base from which they fixed this price? Do you know the principle they used or how they went about it at all?

Mr. GREENE. No, I do not.

PRICE INCENTIVE

Senator MALONE. Another thing that does not make sense to me—I may be entirely wrong—is that you suddenly announce that you will double the world price——

Mr. GREENE. That is right.

Senator MALONE. And you paid the same from Nigeria, where labor is worth probably 40 cents a day, as you pay out in Idaho, where the labor is $15 a day. You knew that, I guess.

Mr. GREENE. I am sure the officials of DMPA knew that, but I think the reason for doubling the price wasn't a question of what labor was getting, as I understood or what I heard. It was a question of keeping these mines going instead of having them shut down.

Senator MALONE. What mines?

Mr. GREENE. The mines in Nigeria and the Belgian Congo.

Senator MALONE. You have heard the testimony before this committee, that you cannot get it from Nigeria when war starts. You are in an organization that has to stockpile, you have to furnish for industry, and you are looking ahead, are you not?

Mr. GREENE. Yes; that is true. We were looking ahead. We were looking, at that time, to get as much into this country to meet stockpile requirements and the requirements set by ODM——

Senator MALONE. Did you realize you probably could not carry enough in a stockpile to last a long war, and that you would have to develop something, if possible, in this hemisphere or in this Nation?

Mr. GREENE. We were developing it in this hemisphere, too. Since that time——

Senator MALONE. At the same price.

Mr. GREENE. At the same price. We developed some in Brazil.

Senator MALONE. What do you think would happen in this country if you were to pay the differences in the wages and the taxes to the people here in Idaho and North Carolina, or wherever you find it, in addition to what you pay in Nigeria? Do you think you would get more of it?

Mr. GREENE. If it was available, we probably would; but it is my understanding——

Senator MALONE. You do not know whether you would or not?

Mr. GREENE. We don't know.

Senator MALONE. You never tried it?

Mr. GREENE. It was never tried, sir.

Senator MALONE. Why don't you try it? Did you ever think of it?

Mr. GREENE. The program is still open, as far as——

Senator MALONE. I think it is open. You do not have any of it. That is the reason it is open.

Let me just explain—I do not say it is the position of the committee, but I have lived with this thing for 30 years, and the thing that you have always done here in the East, when you get cooped up in one of these alphabet agencies, is generally to pay more for foreign ore than you do for domestic ore. We have several contracts from your organization, GSA, at least, where you paid more for zinc in Africa as the maximum price than you were paying under contracts here. That is true, is it not?

Mr. GREENE. It probably is.

Senator MALONE. Why?

Mr. GREENE. That is a long story.

Senator MALONE. It isn't so very long. It is going to get short here.

Mr. GREENE. We don't set the requirements.

Senator MALONE. I am not talking about the requirements. You are the one who set the price, your organization. Maybe you did not personally. I am trying to find out who did. I guess it is a couple of men who have gone back to their work. You had nothing to do with it. No one who is presently in the Administration that you know of had anything to do with setting the price?

Mr. GREENE. Not the price for columbium-tantalum.

Senator MALONE. Isn't there anybody over there who was associated with Mr. Howard Young or Mr. Lyon, still there?

Mr. MOORE. I don't believe there is, sir; no sir.

FEDERAL ASSISTANCE TO DOMESTIC AND FOREIGN MINES

Senator MALONE. At this point I will insert in the hearings an analysis of Federal assistance, which shows we gave far greater assistance to foreign mines as compared to United States mines.

Columbium, foreign assistance, $28½ million; domestic, $8¾ million.

Lead and zinc, foreign, $17 million; domestic, $6½ million.

Tungsten, foreign, $34½ million; domestic, $14 million.

I am going to make one more observation, and I want you to explain all you can to this commitee. How are you going to get columbium or tantalum or cobalt, paying more for foreign ore than you do to domestic producers? How do you think we are ever going to become self-sufficient, either in this country or in the Wetsern Hemisphere?

This thing has been going on, as far as we can determine, for several years, and your organization has been sitting over there making foreign contracts for some reason, I would like to know, paying more per unit, letting greater contracts for foreign minerals, for everything, right down the line, than you have for the domestic product or the products of the Western Hemisphere. Explain it to me, if you can.

Mr. GREENE. Senator, I didn't set the policy, so I don't know if it is for me to say.

Senator MALONE. You live over there. What are the reasons?

Mr. GREENE. I do live over there, and I have lived with DMPA from its inception.

Senator MALONE. What have you heard in the talk? What is it?

Mr. GREENE. First of all, I think we are looking at this picture or trying to analyze the workings of 3 or 4 agencies.

Senator MALONE. Who are they?

Mr. GREENE. ECA was handling foreign contracts——

Senator MALONE. Oh, they were?

Mr. GREENE. Which were inherited by DMPA.

Senator MALONE. Who handled ECA?

Mr. GREENE. It was handled by a division of the Economic Cooperation Administration headed by Mr. Charley Stott.

Senator MALONE. Stott?

Mr. GREENE. Yes, sir.

Senator MALONE. Where is he now?

Mr. GREENE. He is with an African mining company, Tsumeb Mining Corp.; am I right?

Senator MALONE. Did Mr. Stott have something to do with these contracts with the Tsumeb Mining Corp.?

Mr. GREENE. I don't think ECA has any contract with them.

Mr. MOORE. I wouldn't know that.

Mr. GREENE. I will look that up now.

Senator MALONE. Will you look that up?

Mr. GREEN. I will look that up now.

Senator MALONE. Now tell me, how would you get columbium for the stockpile and for the industrial consumers?

Mr. GREENE. As far as DMPA is concerned, our policy from the inception had been always to give first consideration to domestic production within our own boundaries. The second consideration on any of these contracts——

Senator MALONE. I do not think that is true. I do not think the contracts show it.

Mr. GREENE. I think they do, sir, as far as DMPA was concerned.

Senator MALONE. What is DMPA?

Mr. GREENE. That is the organization that was created under the authority of the Defense Production Act to expand production in connection with borrowing authority of the funds.

Senator MALONE. What became of it?

Mr. GREENE. It has been abolished by Executive Order 10,480, and the remains of it has been transferred to the Emergency Procurement Service of the General Services Administration.

Senator MALONE. Is that where you are?

Mr. GREENE. That is where I am; yes, sir.

Senator MALONE. Will you look up those contracts for the benefit of the committee and have them here tomorrow morning?

Mr. GREENE. All right, sir.

Senator MALONE. Counsel for the committee will review some of those contracts.

Mr. ADLERMAN. These are not the contracts but are the total amounts spent by DMPA and ECA, and so forth, on various minerals and metals, both foreign and domestic. You find the domestic mineral expansion possibly in the hands of the DMPA, with some advances by the Interior Department in the exploration program and RFC loans. There is no help, of course, from ECA or MSA domestically. However, ECA and MSA and their successor now, I suppose, the FOA——

Senator MALONE. What is that?

Mr. GREENE. Foreign Operations Administration.

Senator MALONE. You had better get what you can out of it, because a lot of them are going by the board one of these days.

Mr. ADLERMAN. I think it is true to a certain extent, with the exception of columbium-tantalum and a couple of others, that most of the foreign expansion programs have been done with MSA and ECA dollars. The total amount spent by MSA and ECA abroad has exceeded the amount spent domestically on these programs by several million dollars.

I think that is covered altogether on pages 305, 306, and 308 to 310, in part II of the stockpile report.

Senator MALONE. I think we determined that 77 percent of your stockpile is made up of foreign ore, with the ore here in the United States running out of your ears.

Mr. GREENE. Senator, stockpiling was not done by Defense Materials Procurement Agency, with which I was connected before its functions were transferred to the General Service Administration and I am not familiar with the figures on stockpiling operations. I am speaking only about the Defense Materials Procurement Agency activities. I assure you, Senator, the considerations that would be yours were ours, namely, to expand materials within our own continent. That was our first consideration.

Senator MALONE. But how?

Mr. GREENE. Through advances, through Government assistance, namely——

Senator MALONE. At the same price that you paid for foreign?

Mr. GREENE. No. In some instances it was at a higher price.

Senator MALONE. In some instances the foreign price in Africa was above the price paid here.

Mr. GREENE. Those might have been prices paid by ECA.

Senator MALONE. I do not know which one it was.

Mr. GREENE. Maybe in some cases.

Senator MALONE. I do not know which one of the alphabetical agencies it was.

Mr. GREENE. It might have been in some isolated cases. That might be so, Senator.

Mr. ADLERMAN. We had instances where they were paying 17 cents on floor price contracts, with a ceiling price of 20 cents, when lead in this country was selling for 12½ cents. They had a 5-year term, which doesn't run out for another 4 or 5 years now.

Mr. GREENE. That is possible.

Senator MALONE. That was about the time we were loaning money or giving it away to England and other nations to stockpile metals, and they later broke our market by shipping them into this country. Do you remember that incident?

Mr. GREENE. I remember it. DMPA itself was not in favor of that. There may be cases where we did pay more——

Senator MALONE. But they operated on the basis of allowing it to be done.

Mr. GREENE. No. I might say Mr. Young, president of the American Mining Congress, was always very, very mindful of the domestic mining situation. In the overall an agency, that had contingent commitments close to $10 billion which we made during the time that DMPA was in existence, you will find cases where we did pay more fore overseas material, but there were other considerations. But generally, when we had to fill an annual production goal, and it could not be filled from domestic production we did go overseas for the material.

Senator MALONE. You mean on a long-term contract?

Mr. GREENE. On a long-term contract.

Senator MALONE. Let's just let that go. Apparently you do not know very much about it and were not responsible for it. Let us assume you have the authority now to get these industrialists columbium, tantalum, and cobalt. Mr. Kline has testified that we have

these deposits in this country and in other nations in the Western Hemisphere—how would you go about it now?

Mr. GREENE. I think in view of what we have heard here this morning, Senator, we would be willing, subject to directives from ODM, to do what is necessary to get the material, enter into such contracts as are necessary to get the material. Whatever form of assistance would be needed to get the material.

Senator MALONE. Would there be any objection to using a little common horsesense in determining what the wages were and making some differential in the foreign contracts and domestic contracts?

Mr. GREENE. No; there would be no objection. We should use some common horsesense.

Senator MALONE. As far as we can understand here, there has been very little of it used up to date.

Mr. GREENE. Certainly we should correct that situation, Senator. There is no question about it.

Senator MALONE. If you are going to make contracts in Nigeria or the Belgian Congo where the wages may be $1 a day at the maximum, probably 40 cents—when I was over there it was about 40 cents when they got it, and nobody was very particular whether they got it or not—and in Idaho or any State area where there might be good prospects, where the wages may run anywhere from $11 a day to $15 a day, what would you do if you were going to figure out a schedule of contracts for Nigeria and the Belgian Congo, and Idaho and other points within the United States of America or in Canada or South America?

Mr. GREENE. You mean for long-term pull, Senator?

Senator MALONE. Any time.

Mr. GREENE. I think the first thing DMPA, or now EPS, Emergency Procurement Service——

Senator MALONE. Let's mention these names. It may be you have memorized them, but I cannot.

Mr. GREENE. The Emergency Procurement Service should first see if they can meet the requirements goal by only domestic contracts, and render whatever assistance is necessary to domestic contracts.

Senator MALONE. Nobody is asking you to make only domestic contracts, but we would like to see you make some so you would get material, so you would attract the miners and people who know how to mine this ore. What is your background?

Mr. GREENE. I am an attorney, sir.

Senator MALONE. Most of them are in these jobs, I will have to say that. That is nothing against an attorney, but we only hire them where there is some law business out in Nevada. When we want a mine we get an engineer. Do you have any?

Mr. GREEN. We have some engineers.

### DOMESTIC AND FOREIGN CONTRACTS ON COLUMBIUM

Mr. MOORE. At the present time, sir, there is under negotiation a contract for the purchase of a very substantial quantity of columbium-tantalum ores from Bear Valley, Idaho.

Senator MALONE. What are you offering for it?

Mr. MOORE. That I do not know. I haven't taken part in that negotiation. Mr. Gumbel has been carrying that on. I do know that that is under negotiation.

Senator MALONE. You do not know anything about the price that you are offering?

Mr. MOORE. No, sir; I don't know the price.

Senator MALONE. Are you negotiating any further contracts in Africa or any other foreign nation?

Mr. MOORE. No. There have been no more contracts in Africa, nor will there be any more since last December.

Senator MALONE. How many of these contracts do you have in Africa now? Do you have a paper that lists all of them there?

Mr. MOORE. Yes. Mr. Wilson, here, is familiar with these. Would you mind if I asked him to testify to them?

Senator MALONE. Go right ahead. Does that table include other than columbium contracts?

Mr. WILSON. No; it is just columbium and tantalum purchases.

Senator MALONE. Read a few sample ones, and then just submit it for the record.

Mr. WILSON. What items do you want read?

Senator MALONE. Give us some idea of what you are paying for it.

Mr. WILSON. It is all based on the Government's purchasing program. It is quite a lengthy thing.

Senator MALONE. What is that? Who prepared that?

Mr. WILSON. That was prepared by DMPA.

Senator MALONE. What is that?

Mr. WILSON. Columbium-tantalum purchasing program.

Senator MALONE. But what is DMPA?

Mr. WILSON. Defense Materials Procurement Agency.

Senator MALONE. You can remember it. You repeat it when you talk about it.

Mr. WILSON. It was mentioned before.

Senator MALONE. I know that.

Mr. WILSON. They prepared this.

Senator MALONE. There are 400 other of them mentioned all the time, too.

Where are they now?

Mr. WILSON. That particular group was abolished.

Senator MALONE. Who took over their work?

Mr. WILSON. The functions and the personnel of that group were taken over by the Emergency Procurement Service, which is a part of the General Services Administration.

Senator MALONE. Is that the service you and Mr. Greene are with?

Mr. WILSON. That is right.

Senator MALONE. Do you approve of the specifications and this form of contract?

Mr. WILSON. Yes; in general, I do.

Senator MALONE. What does it pay and what generally is the contract? What does it offer?

Mr. WILSON. I could read part of it here so you can get an idea. There are several classifications involved. The title of section 5 of this particular columbium-tantalum purchase program is "Specifications and Price." It reads as follows:

**The Government shall pay the following price for columbium-tantalum-bearing ores and concentrates meeting the following specifications, determined on a dry-weight basis:**

(a) For columbium ores and concentrates containing not less than 35 percent combined $Cb_2O_5$ and $Ta_2O_5$, and having a $Cb_2O_5$ and $Ta_2O_5$ ratio of not less than 1 to 1; impurities not to exceed the following maximum limits—

Those impurities are as follows, as maximums:

$TiO_2$, 8 percent; $SnO_2$, 8 percent; FeO, 25 percent; MnO, 13 percent.

The following is the price on that particular grade of materials:

One dollar and forty cents per pound of combined contained pentoxide—

Senator MALONE. What is that?

Mr. WILSON (reading):

One dollar and forty cents per pound of combined contained pentoxide—

That means $Cb_2O_5$ plus $Ta_2O_5$. That is oxide, not the metal, contained oxide—

plus 2 cents per pound for each additional full percent of combined contained pentoxide above 35 percent.

That classification (a) takes care of that particular grade of material.

Senator MALONE. What does that mean, in contained metal?

Mr. WILSON. I don't know. You multiply that by 0.49 to get the contained metal.

Senator MALONE. About half?

Mr. WILSON. Yes.

Senator MALONE. Then it would be paying about twice that amount per pound of metal.

Mr. WILSON. Yes, roughly.

Senator MALONE. What would that make the price?

Mr. WILSON. $1.40 is the base price.

Senator MALONE. It would be about $2.80, then, or $2.75 per pound of contained metal.

In this particular setup, am I right that it would be about $2.75 per pound of contained metal?

Mr. WILSON. Yes.

Senator MALONE. In what area does that price apply?

Mr. WILSON. All areas.

Senator MALONE. Foreign and domestic?

Mr. WILSON. Yes; foreign and domestic.

Senator MALONE. That applies to the domestic price, as well as foreign price, and you are still going by that?

Mr. WILSON. That is right. It was designed originally to get the material as quickly as possible. We went where the major source was. That is where we got most of it.

Senator MALONE. You consider that a very liberal price for foreign and domestic, either one or both?

Mr. WILSON. I don't want to express an opinion on that, because I had nothing to do with setting this up. I am just trying to explain it.

Senator MALONE. This is just an inquiry for the record. What is your background in this matter?

Mr. WILSON. I am a mining engineer.

Senator MALONE. From where?

Mr. WILSON. You mean here in Washington?

Senator MALONE. From where originally? You did not learn your mining here, did you?

Mr. WILSON. Like most mining engineers, I have traveled around considerably.

Senator MALONE. Where are you from?

Mr. WILSON. I have operated in the United States, in the Philippine Islands, and Mexico.

Senator MALONE. Where were you born?

Mr. WILSON. Ohio.

Senator MALONE. You had to be born someplace. Where did you go to school?

Mr. WILSON. Carnegie Tech.

Senator MALONE. A very good school.

You are carrying out these specifications, and you say you do not understand them or you do not know whether you agree with them or not?

Mr. WILSON. I didn't say I didn't understand them. I said I didn't want to comment on whether I felt the prices were right.

Senator MALONE. If you did not think the price was right, why do you not say something about it? That is what I asked you.

Mr. WILSON. I didn't have anything to say. It isn't my place to say.

Senator MALONE. But it is now.

Mr. WILSON. It is a published schedule.

Senator MALONE. I am asking you, for the record of the committee, do you think the price is right for domestic ore so as to promote the production of ore?

Mr. WILSON. I think this is a fair price; if there is any around to be had, I think they should come forth with it.

Senator MALONE. You mean you think in Idaho that is a fair price?

Mr. WILSON. I imagine it is. I don't know just what their cost of production would be there in Idaho. I don't know anything about it.

Senator MALONE. Who does know, in your organization?

Mr. WILSON. I don't know that anyone does.

Senator MALONE. That is an honest confession which is good for the soul. I think you are right.

Mr. WILSON. My particular bailiwick is Africa and Europe.

Senator MALONE. Is there someone here who works in the United States of America?

Mr. WILSON. Mr. Brussolo I think has worked somewhat along those lines.

Senator MALONE. You tell us what you have done.

Mr. BRUSSOLO. I am from California, a graduate of the University of California.

Senator MALONE. That is a good start. Do you understand the specifications and the price offered?

Mr. BRUSSOLO. Yes, sir. I understand this particular program. I came in late, like the rest of them. In other words, I had nothing to say on that except to follow the order, except that I might say, Senator, that in order to push the purchase or the development of these particular minerals, columbium and tantalum, and since most of the production comes from foreign countries, comes from Africa, the particular price setup—this is just my inference—was naturally mostly applicable to foreign ores, because at that time the production of columbium-tantalum in the United States amounted to practically nothing. We were dependent completely on foreign sources.

This particular price was evidently—this is just an inference on my part—set for the foreign producers.

Senator MALONE. You have been in the mining engineering business for some time. How do you establish an incentive to find ore in this country?

Mr. BRUSSOLO. You have to take into consideration the different factors, made up of labor conditions, freight, geological conditions, and weigh those particular factors for the particular areas when you come down to it. This is just a personal opinion, Senator.

Senator MALONE. It sounds very good so far.

Mr. BRUSSOLO. You have to take in the location, the geological condition, the labor costs, the material costs, and all the integrated factors that are a part of the price structure.

Senator MALONE. Has that been done for the domestic production?

Mr. BRUSSOLO. Not being connected directly, to my knowledge I think not, but I may be wrong on it.

Senator MALONE. This has been going on now only 7 or 8 years. Isn't it time it was done?

Mr. BRUSSOLO. Possibly it is.

Senator MALONE. What is your position, Mr. Greene?

Mr. GREENE. Right now, I am Acting Assistant General Counsel of the General Services Administration.

Senator MALONE. Who is the head of this thing, this organization that you are working with?

Mr. GREENE. The Emergency Procurement Service. Mr. Al Walsh is the Commissioner.

Senator MALONE. Is he here?

Mr. GREENE. No, he is not.

Senator MALONE. Who is directly under him? Does he have an assistant manager?

Mr. GREENE. Mr. Gumbel is the Acting Director of the Materials Division. He was here but he had to leave.

Senator MALONE. We will defer that point until Mr. Gumbel gets back.

Mr. WILSON. Senator, could I add a little more to the way this purchase program was developed originally? I was in on it, but very much on the outskirts. I want possibly to clarify the method by which this price was arranged. I want you to understand I was not directly in on this. I am only trying to be helpful.

Senator MALONE. Let me ask you another question. Do you fellows take these jobs over and then just pick up the record and go on without studying them and understanding them and what you are trying to do?

Mr. WILSON. All we are trying to do is to do our best, like everyone else; but on this particular problem, when they were making up this purchase program, I am reasonably sure that industry was called in and the matter was discussed at Government levels and also with industry.

Senator MALONE. What do you mean by "industry"? Did you bring any miners in who know how to find ore?

Mr. WILSON. I don't know the exact personnel. I am trying to give you the general picture.

Senator MALONE. It is not a very good picture. It isn't looking very good for the organization.

Mr. WILSON. We brought those representatives in and finally came up with this program.

Senator MALONE. If you want to know how to make steel, people were here today who could tell you how to make it, but I doubt if they could tell you how to mine the ore.

Mr. WILSON. I think probably industry knew something about what price would be necessary to draw the ore out.

Senator MALONE. Why would they know? That is your job.

Mr. WILSON. They had been buying it for quite a while, for one thing.

Senator MALONE. They had been buying it from foreign countries.

Mr. WILSON. That is right, and that is where most of it came from.

Senator MALONE. What we are trying to do and what you should have been trying to do is to promote some local production when you did not have any.

Mr. WILSON. Our main purpose at that time was to get as much as we could as quickly as we could.

Senator MALONE. How long ago was that?

Mr. WILSON. This purchase program was published in 1952.

Senator MALONE. That has not been very long ago.

Mr. GREENE. I think it was published in 1952.

Senator MALONE. I will include in the record at this point a copy of the columbium-tantalum purchase program as amended.

[Published in the Federal Register, August 1, 1952, 17 F. R. 7053]

CHAPTER XXIII—DEFENSE MATERIALS PROCUREMENT AGENCY

[Revision 1]

COLUMBIUM-TANTALUM PURCHASE PROGRAM

Section 6 of this regulation is rewritten in its entirety. All other sections remain unchanged.

Sec.
1. Basis and purpose.
2. Definitions.
3. Duration of the program.
4. Participation under the program.
5. Specifications and price.
6. Purchase agents.
7. Deliveries and certification.
8. Weighing, sampling, and analysis.

AUTHORITY: Sections 1 to 8 issued under sec. 704, 64 Stat. 816, as amended, Pub. Law 96, 82d Cong., 50 U. S. C. App. Sup. 2154. Interpret or apply sec. 303, 64 Stat. 801, as amended, Pub. Law 96, 82d Cong., 50 U. S. C. App. Sup. 2093; E. O. 10281, Aug. 28, 1951, 16 F. R. 8789, 3 CFR, 1951 Supp.

SECTION 1. *Basis and purpose.* The purpose of this regulation is to establish a guaranteed purchase program designed to encouraged the expansion of the production of columbium-tantalum bearing ores and concentrates of both domestic and foreign origin. The program was authorized by the Defense Production Administration on January 1, 1952. Under the program the Government agrees to purchase a minimum of 15,000,000 pounds of contained combined pentoxide ($Cb_2O_5$ plus $Ta_2O_5$).

SEC. 2. *Definitions.* (a) "Administrator" means the Administrator of the Defense Materials Procurement Agency.

(b) "Program" means the terms and conditions under which the Administrator will purchase columbium-tantalum bearing ores and concentrates.

(c) "Lot" means shipments of columbium-tantalum bearing ores and concentrates of not less than 2,000 pounds, dry weight.

(d) "Seller" means any individual or firm having title to columbium-tantalum bearing ores and concentrates.

SEC. 3. *Duration of the program.* The program shall terminate and be of no further force or effect as of the close of business on December 31, 1956: *Provided, however,* That the Administrator may terminate the program as of the date when the Government has purchased 15,000,000 pounds of contained combined pentoxides ($Cb_2O_5$ plus $Ta_2O_5$).

SEC. 4. *Participation under the program.* Any seller may offer for sale to the Government columbium-tantalum bearing ores and concentrates of either domestic or foreign origin which meet the specifications provided in section 5 of this regulation by delivering and offering such material to the Government in accordance with the terms and conditions as set forth in this regulation, at any time prior to the termination of the program.

SEC. 5. *Specifications and price.* The Government shall pay the following price for columbium-tantalum bearing ores and concentrates meeting the following specifications, determined on a dry weight basis:

(a) For columbium ores and concentrates containing not less than 35 percent combined $Cb_2O_5$ and $Ta_2O_5$, and having a $Cb_2O_5$ and $Ta_2O_5$ ratio of not less than one to one; impurities not to exceed the following maximum limits:

| | *Percent* |
|---|---|
| $TiO_2$ | 8 |
| $SnO_2$ | 8 |
| FeO | 25 |
| NnO | 13 |

$1.40 per pound of combined contained pentoxide, plus 2 cents per pound for each additional full percent of combined contained pentoxide above 35 percent.

(b) For tantalum ores and concentrates containing not less than 25 percent $Ta_2O_5$ and less than 20 percent $Cb_2O_5$, and containing not in excess of the following maximum impurities:

| | *Percent* |
|---|---|
| $TiO_2$ | 4 |
| $SnO_2$ | 4 |

$3 per pound of contained $Ta_2O_5$ in ores and concentrates containing 30–40 percent $Ta_2O_5$, plus 3 cents per pound for each additional full percent of contained $Ta_2O_5$ above 40 percent, plus an additional 4 cents per pound for each full percent of contained $Ta_2O_5$ above 50 percent.

PENALTY: For tantalum ores and concentrates containing between 25 and 30 percent of $Ta_2O_5$ 6.0 cents per pound will be deducted for each full percent of contained $Ta_2O_5$ under 30 percent.

(c) For columbium-tantalum ores and concentrates containing 25 percent or more of $Ta_2O_5$ and 20 percent or more of $Cb_2O_5$, and containing not in excess of the following maximum impurities:

| | *Percent* |
|---|---|
| $TiO_2$ | 4 |
| $SnO_2$ | 4 |

$1.60 per pound of combined contained pentoxide in ores or concentrates containing a minimum of 45 percent combined pentoxide, plus 2 cents per pound for each additional full percent of combined pentoxide above 45 percent.

(d) Columbium-tantalum bearing ores and concentrates failing to meet the specifications set forth in paragraphs (a), (b), and (c) of this section will be considered for purchase by the Government provided the seller bears the cost of upgrading to the minimum specifications.

(e) Bonus: For lots meeting the above specifications, an incentive bonus amounting to 100 percent of the price specified in paragraphs (a), (b) and (c) of this section will be paid on all accepted deliveries, except that no bonus shall be paid on any lot previously owned by the Government.

SEC. 6. *Purchase agents.* The Fansteel Metallurgical Corporation, North Chicago, Illinois, the Wah Chang Corporation, New York, New York, and the Emergency Procurement Service of the General Services Administration, shall act as purchase agents for and on behalf of the Government under this program. Offers of ores to the Government under this program shall be made to such agents. Purchases made hereunder by the Emergency Procurement Service shall be for the national stockpile.

SEC. 7. *Deliveries and certification.* Deliveries of all purchases made under this program shall be in lots of not less than 2,000 pounds, and shall be (a) in the case of materials of foreign origin, c. i. f. Atlantic ports, and (b) in the case of materials of domestic source, f. o. b. depot of purchasing agent. Each lot

offered to the Government hereunder shall be accompanied by a certificate disclosing the identity of the actual producer. In the event the seller is not the actual producer of the ore, the seller shall receive payment only in the amount of the base purchase price and the bonus payment shall be paid by the Government direct to the actual producer.

SEC. 8. *Weighing, sampling and analysis.* All deliveries shall be subject to weight, sampling, moisture determination and analysis by the Government at its own expenses prior to acceptance. The seller may, at his own expense, have a representative present at the weighing and sampling. Each shipment shall be sampled at the time of unloading at the receiving point by a sampler designated by the Administrator. Each sample shall be analyzed by a recognized commercial laboratory selected by the Administrator. All shipments found not to meet the specifications provided herein shall be rejected. The seller shall be accorded fifteen (15) days to remove the shipment from the unloading site. Upon failure to remove the shipment within fifteen (15) days of due notice, the Administrator may, at his discretion, remove such shipment and the costs of such removal shall be for the account of the seller; or the Administator may, at his option, otherwise dispose of such shipments without liability therefor.

Dated: July 28, 1952.

JESS LARSON,
*Defense Materials Procurement Administrator.*

[F. R. Doc. 52-8482; Filed, July 31, 1952; 8:56 a. m.]

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[Published in the Federal Register, February 11, 1954, 19 F. R. 789]

## TITLE 32A—NATIONAL DEFENSE APPENDIX

### CHAPTER XIV—GENERAL SERVICES ADMINISTRATION

[Regulation 10, Revision 1, Amdt. 4]

### REG. 10—COLUMBIUM-TANTALUM PURCHASE PROGRAM

#### DELIVERIES AND CERTIFICATIONS

Pursuant to the authority vested in me by Executive Order 10480, dated August 14, 1953 (18 F. R. 4939), this regulation, as revised and amended, is further amended as follows:

Delete, in its entirety, section 7, and in lieu thereof substitute the following:

SEC. 7. *Deliveries and certification.* Deliveries of all purchases made under this program shall be in lots of not less than 2,000 pounds: *Provided, however,* That lots of not less than 1,000 pounds of material may be delivered under paragraphs (b) and (c) of section 5 of this regulation meeting the following content requirements:

| | *Percent* |
|---|---|
| $Ta_2O_5$ minimum | 40 |
| $Ta_2O_5$ plus $Cb_2O_5$ minimum | 70 |
| $TiO_2$ maximum | 4 |
| $SnO_2$ maximum | 4 |
| $TiO_2$ plus $SnO_2$ maximum | 6 |

All deliveries shall be (a) in the case of materials of foreign origin, c. i. f. Atlantic ports, and (b) in the case of materials of domestic source, f. o. b. depot of purchasing agent. Each lot offered to the Government hereunder shall be accompanied by a certificate disclosing the identity of the actual producer. In the event the seller is not the actual producer of the ore, the seller shall receive payment only in the amount of the base purchase price and the bonus payment shall be paid by the Government direct to the actual producer.

(Sec. 704, 64 Stat. 816, as amended; 67 Stat. 129; 67 Stat. 417; 50 U. S. C. App. Sup. 2154)

All other provisions of this regulation remain in full force and effect.

This amendment is effective immediately.

Dated: February 4, 1954.

EDMUND F. MANSURE,
*Administrator.*

[F. R. Doc. 54-967; Filed, Feb. 10, 1954; 8:53 a. m.]

## CHAPTER XXIII—DEFENSE MATERIALS PROCUREMENT AGENCY

[Revision 1, Amdt. 1]

### COLUMBIUM-TANTALUM PURCHASE PROGRAM REGULATION

Pursuant to the authority vested in me by Executive Order 10281, as amended, this regulation, as revised, is amended by adding thereto the following which, for convenience, is designated "Article II."

*Purpose.* The purpose of this amendment is to provide a means for small domestic producers of columbium-tantalum ores and concentrates to sell such material to the Government in quantities of less than 2,000 pounds avoirdupois. Under this amendment, the Government will buy at its established purchase depots columbium-tantalum ores and concentrates of domestic origin (defined as ores and concentrates produced within the United States, its Territories, or possessions) offered in any size lots up to 2,000 pounds avoirdupois.

SEC. 9. *Small lot purchases.* For the purposes of this Article II, a "small lot" is defined as any quantity of columbium-tantalum ores or concentrates of less than 2,000 pounds of domestic origin. Any seller may offer to the Government, during the term of this program, at the Government purchase depots located at Spruce Pine, North Carolina; Franklin, New Hampshire; and Custer, South Dakota, small lots meeting the requirements set forth in this Article II, acceptability of small lots shall be determined on the basis of visual inspection by the Government, whose decision shall be final: *Provided, however,* That the seller may request a chemical analysis and if, in the judgment of the Government, a chemical analysis is justified, such an analysis may be made at the seller's expense by a laboratory mutually acceptable to the Government and the producer.

SEC. 10. *Requirements.* (a) Small lots offered for sale to the Government may be rejected if, in the opinion of the Administrator, they are not of acceptable or desirable grade. The removal of objectionable substances, by cleaning, cobbing, or other methods may be required as a condition to purchase by the Government.

(b) All acceptable small lots shall contain a minmum of fifty percent (50%) contained combined pentoxide ($Cb_2O_5$ plus $Ta_2O_5$), and for the purpose of payment all small lots meeting requirements shall be considered as containing not more than fifty percent (50%) contained combined pentoxide ($Cb_2O_5$ plus $Ta_2O_5$).

(c) Each seller shall be required to certify that the small lot offered for sale to the Government is of domestic origin.

(d) The ratio of $Cb_2O_5$ to $Ta_2O_5$ shall not be a factor in the acceptability of a small lot, nor in making payment therefor.

(e) All small lots offered to the Government under this Article II shall be delivered by the seller f. o. b. Government purchase depot.

SEC. 11. *Payment.* Irrespective of the actual $Cb_2O_5$ plus $Ta_2O_5$ content, all small lots meeting requirements shall be purchased at the flat rate of $3.40 per pound of contained combined pentoxides ($Cb_2O_5$ plus $Ta_2O_5$) and for purposes of payment all small lots purchased shall be considered as containing not more than fifty percent (50%) contained combined pentoxide. ($Cb_2O_5$ plus $Ta_2O_5$). This price is the maximum allowed for purchases under this Article II and is calculated to include bonus, premiums and penalties.

(Sec. 704, 64 Stat. 816, as amended, Pub. Law, 429, 82d Cong.; 50 U. S. C. App. Sup. 2154. Interpret or apply sec. 303, 64 Stat. 801, as amended, Pub. Law 429, 82d Cong.; 50 U. S. C. App. Sup. 2093. E. O. 10161, Sept. 9, 1950, 15 F. R. 6105, 3 CFR, 1950 Supp.; E. O. 10281, Aug. 25, 1951, 16 F. R. 8789, 3 CFR, 1951 Supp.)

This amendment is effective as of the date hereof.

Dated: October 24, 1952.

JESS LARSON,
*Defense Materials Procurement Administrator.*

[F. R. Doc. 52-11694; Filed Oct. 28, 1952; 5:03 p. m.]

[Published in the Federal Register, April 4, 1953, 18 F. R. 1887]

## DEFENSE MATERIALS PROCUREMENT AGENCY, WASHINGTON

[Revision 1, Amdt. 2]

### COLUMBIUM-TANTALUM PURCHASE PROGRAM REGULATION

#### PURCHASE AGENTS

Pursuant to the authority vested in me by law, this regulation, as revised and amended, is further amended as follows:

SEC. 6. *Purchase agents.* The Fansteel Metallurgical Corporation, North Chicago, Illinois; Wah Chang Corporation, New York, New York; Kennametal Inc., Latrobe, Pennsylvania, and the Emergency Procurement Service of the General Services Administration, shall act as purchase agents for and on behalf of the Government under this program. Offers of ores and concentrates to the Government under this program shall be made to such agents. Purchases made hereunder by the Emergency Procurement Service shall be for the national stockpile.

(Sec. 704, 64 Stat. 816, as amended; 50 U. S. C. App. Sup. 2154; E. O. 10281, 16 F. R. 8789)

This amendment shall be effective as of the date hereof.

Date: March 30, 1953.

HOWARD I. YOUNG,
*Deputy Administrator.*

[F. R. Doc. 53-2899; Filed, Apr. 3, 1953; 8:49 a. m.]

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[Published in the Federal Register, October 15, 1953, 18 F. R. 6565]

## TITLE 32A—NATIONAL DEFENSE, APPENDIX

### CHAPTER XIV—GENERAL SERVICES ADMINISTRATION

[Revision 1, Admt. 3]

### REG. 10—COLUMBIUM-TANTALUM PURCHASE PROGRAM

#### REDESIGNATION AND DURATION OF PROGRAM

1. This regulation, heretofore codified in Chapter XXIII of Title 32A of the Code of Federal Regulations, shall be hereafter codified in Chapter XIV of Title 32A of the Code of Federal Regulations.

2. Pursuant to the authority vested in me by Executive Order 10480, dated August 14, 1953 (18 F. R. 4939), this regulation, as revised and amended, is further amended as follows:

a. Delete the designation "Reg. 1—Columbium-Tantalum Purchase Program" and in lieu thereof substitute the following: "Reg. 10—Columbium-Tantalum Purchase Program."

b. Delete, in its entirety, subsection (a) of section 2, which reads: "(a) 'Administrator' means the Administrator of the Defense Materials Procurement Agency." and in lieu thereof substitute the following: "(a) 'Administrator' means the Administrator of General Services."

c. Delete, in its entirety, section 3 and in lieu thereof substitute the following:

SEC. 3. *Duration of the program.* The program, as it applies to columbium-tantalum bearing ores and concentrates of domestic origin (defined herein as ores mined and concentrates produced from ores mined within the United States, its Territories or Possessions), shall terminate and be of no further force or effect as of the close of business on December 31, 1958. The program, as it applies to columbium-tantalum bearing ores and concentrates of foreign origin, shall terminate and be of no further force or effect as of the close of business on December 31, 1956: *Provided, however,* That the Administrator may terminate the program, as it applies to columbium-tantalum bearing ores and concentrates of both domestic and foreign origin, as of the date when the Govern-

ment has purchased 15,000,000 pounds of contained combined pentoxides ($Cb_2O_5$ plus $Ta_2O_5$).

(Sec. 704, 64 Stat. as amended, Pub. Laws 95, 206, 83d Cong.; 50 U. S. C. App. Sup. 2154)

All other provisions of this regulation remain in full force and effect.

This amendment is effective immediately.

Dated: October 9, 1953.

EDMUND F. MANSURE, *Administrator.*

[F. R. Doc. 53-8761; Filed, Oct. 13, 1953; 1:10 p. m.]

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[Published in the Federal Register, February 11, 1954, 19 F. R. 789]

TITLE 32A—NATIONAL DEFENSE, APPENDIX

CHAPTER XIV—GENERAL SERVICES ADMINISTRATION

[Regulation 10, revision 1, amdt. 4]

REG. 10—COLUMBIUM-TANTALUM PURCHASE PROGRAM

DELIVERIES AND CERTIFICATIONS

Pursuant to the authority vested in me by Executive Order 10480, dated August 14, 1953 (18 F. R. 4939), this regulation, as revised and amended, is further amended as follows:

Delete, in its entirety, section 7, and in lieu thereof substitute the following:

SEC. 7. *Deliveries and certification.* Deliveries of all purchases made under this program shall be in lots of not less than 2,000 pounds: *Provided, however,* That lots of not less than 1,000 pounds of material may be delivered under paragraphs (b) and (c) of section 5 of this regulation meeting the following content requirements:

| | *Percent* |
|---|---|
| $Ta_2O_5$ minimum | 40 |
| $Ta_2O_5$ plus $Cb_2O_5$ minimum | 70 |
| $TiO_2$ maximum | 4 |
| $SnO_2$ maximum | 4 |
| $TiO_2$ plus $SnO_2$ maximum | 6 |

All deliveries shall be (a) in the case of materials of foreign origin, c. i. f. Atlantic ports, and (b) in the case of materials of domestic source, f. o. b. depot of purchasing agent. Each lot offered to the Government hereunder shall be accompanied by a certificate disclosing the identity of the actual producer. In the event the seller is not the actual producer of the ore, the seller shall receive payment only in the amount of the base purchase price and the bonus payment shall be paid by the Government direct to the actual producer.

(Sec. 704, 64 Stat. 816, as amended; 67 Stat. 129; 67 Stat. 417; 50 U. S. C. App. Sup. 2154)

All other provisions of this regulation remain in full force and effect.

This amendment is effective immediately.

Dated: February 4, 1954.

EDMUND F. MANSURE, *Administrator.*

[F. R. Doc. 54-967; Filed, Feb. 10, 1954; 8:53 a. m.]

Mr. RALSTON. Was this base price mentioned by Mr. Wilson the only payment?

Mr. WILSON. No, it was not.

Senator MALONE. I didn't hear you.

Mr. RALSTON. Was the base price mentioned by Mr. Wilson at the point at which he was interrupted the only payment made for the ore?

Mr. WILSON. No, it was not.

Senator MALONE. Then go on through with it and tell me what you finally paid for the metal content per pound.

Mr. WILSON. What we called an incentive bonus amounted to 100 percent. In other words, we paid the base price and multiplied by 2.

Senator MALONE. What was the base price?

Mr. WILSON. In the case of the contained pentoxides 35 percent base, it was $1.40. If 35 percent concentrates were delivered, we would pay $2.80 for the contained oxides, or $5.60 for the metal.

Senator MALONE. Then you would double that price, $2.80.

Mr. WILSON. Yes, the $2.80 was doubled to $5.60 for the metal.

Senator MALONE. For the contained metal. That would be for foreign or domestic.

Mr. WILSON. That is right.

Senator MALONE. What contracts have you made under that category?

Mr. WILSON. There are about 17 of them, amounting to roughly 3,500 short tons of contained pentoxides. Incidentally, that represents concentrates. Those concentrates vary in content. The whole batch might average, say, about 65 percent pentoxides. After you got that figure, then you would divide that by half.

Senator MALONE. How many contracts did you let?

Mr. WILSON. About 17 of them here.

Senator MALONE. In what area?

Mr. WILSON. They are in Nigeria, Belgian Congo, Uganda, southwest Africa.

Senator MALONE. All in Africa?

Mr. WILSON. That is right.

Senator MALONE. Did you let any in this country?

Mr. WILSON. I am not familiar with that. Mr. Brussolo could answer that.

Senator MALONE. Would you like to submit that table for the record? You can take it and correct it, if you want to.

Mr. WILSON. It is all right as it stands. It is foreign purchases. It is entitled "Foreign purchases of columbium-tantalum concentrates with Public Law 774 funds." The purchase program is attached, and it is quite long.

Senator MALONE. Does it show the deliveries?

Mr. WILSON. Over at the righthand side you will see two columns showing the time schedule of deliveries, the start and the finish.

Senator MALONE. This shows that four of these contracts were completed in 1953. It shows one with a February 1, 1954, completion. It shows six of them to be completed at the end of 1956.

Mr. WILSON. The purchase program extends to December 31, 1956. Most of those contracts terminate the same date.

Senator MALONE. All but three of these contracts are already underway, according to the record here, the ones that have not been completed. Let me ask you, did you get all the ore you were supposed to get under these contracts which were completed according to the scheduled date?

Mr. WILSON. I can't tell you whether the deliveries were made on schedule or not.

Senator MALONE. I do not care about the schedule. Have you now received all of the metal under these contracts? Have all of them been started on schedule that show a starting date here?

Mr. WILSON. As far as I know.

Senator MALONE. Will you get the answer for us, whether you secured all the ore under the contracts that show the completion date already passed?

Mr. WILSON. I have reports here which I would be glad to submit for the record which would give that information. These are as of January 6, 1954.

Senator MALONE. That is too much to put in the record. Just look in there and see if all the ore has been delivered under the contracts which you show here have been completed. In Nigeria you show a contract completed October 31, 1953, GL–OOP (D) 19008.

Mr. WILSON. Under that contract 14,818 pounds of concentrates have been delivered, and of that amount 10,076 pounds of contained pentoxides have been accepted.

Senator MALONE. How much did it call for in the first instance?

Mr. WILSON. Nine thousand eight hundred pounds of contained pentoxides.

Senator MALONE. About half of it has been delivered?

Mr. WILSON. There is a slight overdelivery.

Senator MALONE. Then I misunderstood your figures. Would you read them again?

Mr. WILSON. The contract quantity is 9,800 pounds of contained pentoxides. The accepted figure is 10,076, which is an overage.

Senator MALONE. Now we go on to the next one here, with a completion date of February 1, 1954, with H. A. Watson & Co., GS–OOP (D) 19018.

Mr. WILSON. There have been no deliveries up to January 6.

Senator MALONE. What does it call for?

Mr. WILSON. 1,568 pounds of $Cb_2O_5$ and $Ta_2O_5$.

Senator MALONE. There have been no deliveries?

Mr. WILSON. None as of January 6.

Senator MALONE. Go on to the next one with S. W. A. Lithium, GS–OOP (D) 19019.

Mr. WILSON. The contract quantity is 1,400 pounds of contained pentoxides and 2,050 pounds have been delivered. That is an overage, too.

Senator MALONE. I wonder if you could fill this out showing the deliveries before we put it in the record.

Mr. WILSON. This report gives it.

Mr. ADLERMAN. I think we ought to have it on one combined sheet.

Senator MALONE. The next one, 19021, with the Mineral Trading Corp.

Mr. WILSON. There have been no deliveries on that as of January 6.

Senator MALONE. It was supposed to have been completed by November 30, 1953. How much were you supposed to get?

Mr. WILSON. 2,800 pounds of contained pentoxides.

Senator MALONE. There have been no deliveries?

Mr. WILSON. No deliveries.

Senator MALONE. This does not show what you were supposed to get or the deliveries.

Mr. WILSON. Yes, it shows the contract quantity in short tons of concentrates. This figure shows the pounds of contained oxides.

Senator MALONE. I see. Does that table have all the information that this one contains?

Mr. WILSON. In different form.

Senator MALONE. You have a contract, 19022, the delivery completion date of which was November 30, 1953. Is that 3 tons the quantity?

Mr. WILSON. It is shown here as 2,800 pounds of contained oxides, and the delivery amount is 5,936 pounds of concentrates.

Senator MALONE. That is a good record. There are only two of the contracts that have not been delivered?

Mr. WILSON. I think that is correct.

Senator MALONE. If you will take this table and complete it for us with just the amounts supposed to be delivered and the amounts delivered until the completion date of the contract, then we will make it a part of the record.

(The table referred to follows:)

*Foreign purchases of Cb–Ta concentrates with Public Law 774 funds (up to Feb. 15, 1954)*

| Contract No. and date | Contractor | Origin | Material | Quantity | Unit price (c. i. f., New York) | Estimated total cost | Delivery schedule | | $Cb_2O_5$ and $Ta_2O_5$ concentrates (delivered up to Jan. 6, 1954) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Start | Finish | |
| | | | | *Short tons* | | | | | *Pounds* |
| GS–OOP (D) 19008 Aug. 12, 1953. | H. A. Watson & Co | Nigeria | $Cb_2O_5$ and $Ta_2O_5$ concentrates. | 7.00 | (1) | $41,160 | Aug. 12, 1953 | Oct. 31, 1953 | 14,318 |
| GS–OOP (D) 19015 | Keffi Tin Co., Ltd | do | do | 750.00 | (1) | 3,267,218 | Dec. 31, 1953 | Dec. 31, 1956 | 100,800 |
| GS–OOP (D) 19016, Mar. 31, 1953. | Amalgamated Tin Mines | do | do | 490.00 | (1) | 2,134,582 | do | do | 292,594 |
| GS–OOP (D) 19017, Oct. 16, 1953. | Tin & Associated Minerals | do | do | 360.00 | (1) | 2,003,120 | July 1, 1954 | do | None |
| GS–OOP (D) 19018, Sept. 23, 1953. ) | H. A. Watson & Co | do | do | 1.12 | (1) | 6,585 | Sept. 23, 1953 | Feb. 1, 1954 | None |
| GS–OOP (D) 19019, Sept. 11, 1953. | S. W. A. Lithium | Southwest Africa. | do | 1.00 | (1) | 6,700 | Sept. 11, 1953 | Sept. 30, 1953 | 2,050 |
| GS–OOP (D) 19021, Oct. 7, 1953. | Mineral Trading Corp | do | do | 2.00 | (1) | 11,760 | Oct. 7, 1953 | Nov. 30, 1953 | None |
| GS–OOP (D) 19022, Oct. 6, 1953. | Cape Metals | do | do | 3.00 | (1) | 17,640 | Oct. 6, 1953 | do | 5,936 |
| GS–OOP (D) 19023, Oct. 6, 1953. | Philipp Bros. (as agent for A. J. Batt) | Nigeria | do | 16.80 | (1) | 82,468 | July 1, 1954 | Dec. 31, 1956 | None |
| GS–OOP (D) 19024, Jan. 8, 1954. | Philipp Bros. (as agent for Fobratin, Ltd.). | do | do | 33.60 | (1) | 164,936 | do | do | None |
| GS–OOP (D) 19025, Oct. 6, 1953. | Bisichi Tin Co | do | do | 900.00 | (1) | 5,017,600 | Apr. 1, 1954 | do | None |
| GS–OOP (D) 19026, Oct. 30, 1953. | Kagera Mines, Ltd | Uganda | do | 50.00 | (1) | 219,600 | Oct. 1, 1953 | June 30, 1955 | None |
| GS–OOP (D) 19027, Feb. 10, 1954. | Compagnie Geologique et Miniere des Ingenieurs et Industriels Belges. | Belgian Congo | do | 661.40 | (1) | 2,456,181 | July 1, 1954 | Dec. 31, 1956 | None |
| GS–OOP (D) 19028, Jan. 8, 1954. | Philipp Bros. (as agent for K. I. Rowe) | Nigeria | do | 67.20 | (1) | 329,871 | do | do | None |
| GS–OOP (D) 19029, Jan. 8, 1954. | Philipp Bros. (as agent for M. C. Turner). | do | do | 50.40 | (1) | 247,200 | do | do | None |
| GS–OOP (D) 19030, Jan. 8, 1954. | Philipp Bros. (as agent for Nigeria Alluvial, Ltd.). | do | do | 44.80 | (1) | 219,914 | do | do | None |
| | Total | | | 3,438.32 | | 16,226,535 | | | |

DEVELOPMENT PROJECTS

$7,368

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| GS–OOP–(D) 925, Apr. 26, 1951. | Kingdom of Norway (Ulefoss project) | Norway | $Cb_2O_5$ concentrates. | 396.00 | (1) | [2] $265,000<br>[2] 1,500,000 | Sept. 15, 1953 | Dec. 31, 1956 | [3] 7,368 |
| DMP III–19, Apr. 23, 1953. | Gold & Base Metals | Nigeria | CB–TA concentrates. | [4] 250.00 | (1) | [5] 700,000 | 2d half 1954 | June 30, 1956 | [6] |
| DMP III–22, June 25, 1953. | United States Tin Mining Co | Southwest Africa. | CB–TA–BeO concentrate. | 50.00 | (1) | [7] 140,000 | Jan. 1, 1954 | Jan. 1, 1956 | [6] |

[1] Pricing on Cb–Ta concentrates and credit for repayments against advances are based on sec. 5 of the attached Cb–Ta Purchase Program published in Federal Register Aug. 1, 1952.

These prices are discounted 5 percent for deliveries up to June 30, 1955, and 10 percent for period July 1, 1955, to Dec. 31, 1956. Premiums and bonuses on premiums are not discounted.

Short-term purchases (less than 6 months deliveries) carry full pricing as set forth in the attached CB–TA Purchase Program.

[2] Advance against production of $265,000 in ECA funds, repayment to be made, plus 2½ percent interest, in Cb concentrates for United States stockpile; $1,500,000 of Public Law 774 funds obligated to purchase balance of estimated 396 short tons.

[3] Delivered up to Jan. 1, 1956.

[4] Estimate.

[5] Advance against production of $700,000 in ECA counterpart, with repayment to be made plus 5 percent interest in CB–TA concentrates for the United States Stockpile, estimated at 250 short tons.

[6] No deliveries to Jan. 1, 1956.

[7] Advance against production of $140,000 in ECA counterpart, with repayment to be made, plus 5 percent interest in CB–TA concentrates for the United States stockpile, estimated at 50 short tons. Some repayments may be made in BeO concentrates.

Senator MALONE. You have already said that you have nothing to do with the local contracts in this Nation or in the Western Hemisphere; you are only in Africa?

Mr. WILSON. Europe and Africa.

Senator MALONE. Europe would mean the 17 or 18 or 20 European countries?

Mr. WILSON. Europe proper—France, Germany, Italy, Greece, and their overseas territories or colonies.

Senator MALONE. Do we get this metal from Europe?

Mr. WILSON. All this material came from Nigeria, Southwest Africa.

Senator MALONE. From the colonies of some of these countries. You buy it direct, really, from the colonial nations.

Mr. WILSON. We buy directly from the producer or its agent.

Senator MALONE. What did you mean when you said that you get the metal from Europe? There is no metal there; is there?

Mr. WILSON. No. My particular field of activity is Europe and Africa. My duties on my job include that area.

Senator MALONE. But there is no metal in Europe; is there?

Mr. WILSON. We have a small project which is financed with ECA funds in Norway on columbium, $265,000, made in connection with the European recovery program.

Senator MALONE. Have you received any of it?

Mr. WILSON. Yes; we have received some of it.

Senator MALONE. That is not shown on that table; is it?

Mr. WILSON. Yes; the contract is shown, but not the amount received. I don't know any of the amounts received on this.

Senator MALONE. But it shows the source; does it?

Mr. WILSON. Yes.

Senator MALONE. Mr. Gumbel has not come back?

Mr. GREENE. No; he has not; I am sorry, sir. He had a 3:30 appointment. He said he would come back as soon as that was over.

Senator MALONE. Go ahead if you have other information for the committee. I diverted you there because, at least as far as you know, you have no plans for buying in this Nation and making no distinction in price.

Mr. GREENE. I said, Senator, that from what we heard this morning we would.

(Off the record.)

(Senator Malone left the hearing room.)

### DOMESTIC SOURCES OF COLUMBIUM

Mr. ADLERMAN. I don't think there is much point in continuing on the prices and foreign contracts for the moment until Senator Malone gets back, but I would like to continue with Mr. Kline's statement.

Mr. KLINE. I would like to continue with some more possible resources within the United States. When I left off we were talking about potential deposits in Arkansas. We know that over 200,000 tons of black sand containing 175 tons of columbium are produced annually in conjunction with the bauxite-processing industry of Arkansas. In addition, the red-mud waste product from this industry each year contains over 2,000 tons, more than 4 million pounds, or more than 4 years' supply of columbium.

Mr. ADLERMAN. Where are these located?

Mr. KLINE. Arkansas.

Attempts to concentrate this material have been unsuccessful because of the small-particle size of the mineral. The known reserves in the Magnet Cove area are large and could be extended by additional exploration. Over 12½ million tons of ore containing 150 million pounds of columbium are believed to be contained in this deposit. However, it must be emphasized that to continue blocking out additional reserves in the Magnet Cove area before a successful extractive process has been developed would not at this time be warranted. The black-sand product from the bauxite industry, which contains about 0.08 percent columbium, is a more inviting venture than the Magnet Cove deposits, which contain only about 0.06 percent columbium, especially since the black-sand product is already mined and readily available for processing.

There is no assurance that imports will continue to increase or even maintain the 1953 level. Consumption decreased considerably in 1952 compared with 1949–51. As has already been pointed out at the hearings, this decrease was a result of substitution of titanium for columbium in military aircraft and the development of a very low-carbon steel which requires less columbium as a carbon stabilizer.

For many military aircraft application titanium is not as satisfactory as columbium. Because of the relative availability of the two metals and the quantity required, specifications were based on titanium wherever possible.

In 1953 apparent consumption of combined metal was approximately 1 million pounds, a slight increase over 1952.

The relaxation of end-use controls toward the latter part of 1953, which allowed the use of columbium-tantalum for additional commercial applications, was a contributing factor.

Because of the desirable qualities of columbium-tantalum for many heretofore prohibited applications, and because of relaxation of controls, the demand for these metals in nonmilitary applications can be expected to increase. If larger quantities are available, more military specifications will probably be based on columbium and therefore increase consumption. Processing capacities in the United States are adequate.

The United States received approximately 65 percent of the world production of these minerals in 1952. The United Kingdom and Belgium were the other major recipients and consumers.

Increased United States self-sufficiency in columbium and tantalum depends primarily on the development of improved metallurgical processes and the discovery of economic deposits. Even with new discoveries of complex columbium-tantalum mineral deposits and improved metallurgy, it is doubtful that this country can produce over 50 percent of its requirements. Increased imports may also depend, to a large extent, on the metallurgy of the known, large, pyrochore-type deposits. Western Hemisphere self-sufficiency also depends largely on new metallurgical processes. At least for the near future we must depend on Africa for a large part of our supplies. It is certain that present prices must be maintained to continue the present supply level. Without the 100-percent Government bonus, which has had the effect of a worldwide price increase, it is doubtful if anticipated domestic production increase can be achieved.

In consideration of the desirable qualities of columbium and tantalum, it appears that demand will increase in proportion to availability. That is, supply will determine demand, which is characteristic of many of the rare metals. There is reason to believe that columbium-tantalum will follow this pattern.

In order to fully utilize the desirable properties of these metals, improved metallurgical processes must be developed to extract these metals from their ores and to separate them from each other. At present, tantalum is in shorter supply that columbium, yet only the tantalum contained in high-grade tantalite concentrates can be extracted economically by processes now in use. In 1953 this represented 250,000 pounds of tantalum metal compared with a total supply of 1½ million pounds.

The first commercial process for the extraction and separation of columbium and tantalum, developed by J. Marignac in 1866, or variations of this process, is the only method in commercial use today. The Bureau of Mines has developed, on a laboratory scale, the following processes which show promise of commercial application and which could make available the large quantities of tantalum metal in the national stockpile which cannot be recovered economically by present commercial processes: First, we could use liquid-liquid solvent extraction; second, hydrolysis and selective chlorination; or third, the Kroll process for tantalum metal. These processes successfully developed through the pilot-plant stage, would solve many of our present suppy problems.

The search for new occurrences, particularly placer deposits, should be continued. Large areas favorable for the concentration of columbium-tantalum minerals in placer deposits, heretofore unexplored for these minerals, are known to occur in the Western States.

We would like to make a special point that in the use of columbium and tantalum ores a large percent of the tantalum may be lost. Since tantalum is especially in short supply, we feel that in further use of the metal, some consideration should be given to extracting the tantalum and separating it from the columbium instead of using it in the combined form.

Mr. ADLERMAN. Can you tell me what uses tantalum itself is put to?

Mr. KLINE. It has some very special electronic uses, as were pointed out here today, and also it is used in chemical engineering, medicine, and for alloying purposes.

Mr. ADLERMAN. Are the requirements very large for the tantalum itself?

Mr. KLINE. The requirements are away above what we are able to produce.

Mr. ADLERMAN. Coming back to the bauxite sands in Arkansas, you described them as containing .08; is that correct?

Mr. KLINE. That is correct.

Mr. ADLERMAN. That is already mined. What is the quantity that has been mined there?

Mr. KLINE. Mr. Knickerbocker would be the better one to answer that.

Mr. KNICKERBOCKER. That is the ore which feeds the Aluminum Co. plant and the Reynolds Metals plant; 95 percent of our domestic bauxite, aluminum ore, comes from that area. It amounts to around 1½ to 2 million tons a year of aluminum ore.

Mr. ADLERMAN. Is that a slag pile or tailings?

Mr. KNICKERBOCKER. It is mill tailings.

Mr. ADLERMAN. How much ore is concentrated in that area now?

Mr. KNICKERBOCKER. About 2 million tons a year.

Mr. ADLERMAN. How many years has it been operated?

Mr. KNICKERBOCKER. Reynolds Metals has been operating since about the middle of World War II, and the Alcoa plant started just last year.

Mr. ADLERMAN. Would you say at least 40 million pounds have been produced cumulatively?

Mr. KNICKERBOCKER. I don't have the pounds of ore. I have it only in pounds of columbium.

Mr. ADLERMAN. What would that come to?

Mr. KNICKERBOCKER. The pounds of columbium contained in the black sands, which are impounded, that is, the tailings, are 1⅓ million pounds. That is in the stockpiles.

Mr. ADLERMAN. What would that represent in the way of present consumption?

Mr. KNICKERBOCKER. It is just about the annual consumption.

Mr. KLINE. A little more than a year's consumption.

Mr. KNICKERBOCKER. In the red mud, which is a doubtful reserve because of our inability to recover finely divided metallic values, we have 5 million pounds impounded.

Mr. ADLERMAN. They have not licked that problem yet.

Mr. KNICKERBOCKER. That is one of the things that we are working on at Rolla, Mo.

Mr. ADLERMAN. In the Magnet Cove area, which you state is quite large, there are 17 million tons?

Mr. KNICKERBOCKER. Yes, the proven ore. Two of the main ore bodies in the Magnet Cove area had been drilled by the Bureau of Mines by the end of the last war, and in that proven ore is around 12 million pounds of columbium.

Mr. ADLERMAN. Are you familiar with the extent of the holes that they have drilled there, how far they went and how deep they went?

Mr. KNICKERBOCKER. They are not drilled to the full depth of the deposit of rutile mineral.

Mr. ADLERMAN. How many test holes have they drilled there?

Mr. KNICKERBOCKER. I don't know. Those are reported in Bureau of Mines reports which we could send to your committee.

Mr. KLINE. I would like to pont out, as I stated here, that we have already blocked out more than a million tons of ore. That can be increased very appreciably, but there seems to be little necessity for blocking out more ore until we have a process for treating it. I would like to add that one of the most important conditions for success in research is continuing programs. If we have the knowledge that we can proceed for 3 to 5 years on a research program at limited expense, we can have far more success than we can have with a tremendous amount of money for 1 year.

Mr. ADLERMAN. How deep have these holes gone? Have they hit the bottom of the ore body yet?

Mr. KNICKERBOCKER. Not in all cases.

Mr. ADLERMAN. Do you know how deep they are?

Mr. KNICKERBOCKER. I doubt if any hole attained over 200 feet in depth.

Mr. ADLERMAN. There is no telling how deep they may go.

Mr. KNICKERBOCKER. At some points we don't have the full depth.

Mr. ADLERMAN. Is it possible that, if you went deeper, you might find richer ore bodies?

Mr. KNICKERBOCKER. I am not a mining man, and I can't answer that. I am a metallurgist.

Mr. ADLERMAN. Is Mr. Kaiser here?

Mr. KAISER. Yes.

Mr. ADLERMAN. Are you familiar with that, Mr. Kaiser?

Mr. KAISER. Yes, I am, sir.

Mr. ADLERMAN. Could you tell me how many test holes have been drilled in that area?

Mr. KAISER. As these gentlemen said, that was Bureau of Mines drilling, and while we have followed it, I don't have the figure in mind. Were there several hundred drill holes? Would that be too many, do you think?

Mr. KNICKERBOCKER. I would not want to guess. It is in the records. We have published all of those data.

Mr. ADLERMAN. Again, do you know how far they went down? Is that your field or your area?

Mr. KAISER. I am a supervisor, sir. I have been working other places recently. I am trying to recall. It seems to me that in the older drilling—there may be more recent drilling that I have not followed—about 180 feet was the deepest. The material was essentially the same. The material is very irregular from the surface down to that point. As to whether there would be any chance of its getting richer, all we can say is that there is no indication of that. There is no increase in grades.

Mr. ADLERMAN. How far apart are these test drills?

Mr. KAISER. They vary from 50 feet to several hundred feet in places.

Mr. ADLERMAN. Is that the usual method of exploring a know ore body?

Mr. KAISER. For a deposit of that type I would say "Yes."

Mr. ADLERMAN. Do you think it would pay to do any further exploration on it in view of the shortage of columbium and the possibility that we might develop some further ore?

Mr. KAISER. I think I would answer the same as Mr. Kline has. As an economic geologist I might say that our business really is to develop as much of the material as possible. Certainly it is true, if the material is not going to be worth anything under present practices, there is no reason to develop more than the million tons that Mr. Kline mentioned.

Mr. ADLERMAN. What other ores are associated with the columbium at that property?

Mr. KAISER. That is a rutile ore, a titanium ore.

Mr. ADLERMAN. Rutile is a rare mineral in this country, is it not?

Mr. KAISER. It is one of the titanium ores. It is not the commonest; ilmenite is the common titanium ore.

Mr. ADLERMAN. Is it not correct that rutile has a use that ilmenite does not have, and that is in welding rod coating, for which we are entirely dependent on importation?

Mr. KAISER. I did not catch that.

Mr. ADLERMAN. I said that we have to import all of our rutile now. We do not make any domestic rutile, do we?

Mr. KLINE. Yes, we do.

Mr. ADLERMAN. Is it enough to meet our demands for welding rod coatings?

Mr. BLUE. There is not enough rutile produced in this country at the present time to meet the requirements of the welding rod industry at the present rates of consumption.

Mr. ADLERMAN. What is the rutile that you find there? What percentage do you find in the Magnet Cove property?

Mr. KAISER. A few percent.

Mr. KNICKERBOCKER. It runs up to 6 percent $TiO_2$.

Mr. ADLERMAN. Is that considered low grade?

Mr. KNICKERBOCKER. That is rather a high-grade rutile property for in-place types, a higher grade than average.

Mr. ADLERMAN. Are there any other ores associated with that besides the rutile and the columbium?

Mr. KNICKERBOCKER. No.

Mr. ADLERMAN. Those are the only two that could be recovered?

Mr. KAISER. The columbium is part of the rutile. There are not different minerals in the same material. They are both in the same mineral.

Mr. ADLERMAN. Can they be separated successfully?

Mr. KNICKERBOCKER. That is the problem we are working on.

Mr. ADLERMAN. Are you the one doing most of the research on this, Mr. Knickerbocker?

Mr. KNICKERBOCKER. Yes. We have DMPA funds to carry on this work.

Mr. ADLERMAN. How much is allocated to that?

Mr. KNICKERBOCKER. $75,000 a year.

Mr. ADLERMAN. For how long a program?

Mr. KNICKERBOCKER. A 5-year program.

Mr. ADLERMAN. Do you think that is adequate?

Mr. KNICKERBOCKER. It is adequate at this time for the Rolla laboratory.

Mr. ADLERMAN. Do you feel if you had more money you could perform a better or quicker job?

Mr. KNICKERBOCKER. I don't think we could. It is controlled by the number of technical people we can get on the problem and the other work which we have.

Mr. ADLERMAN. In the event of an all-out war do you think it would pay to put any more people on?

Mr. KNICKERBOCKER. I would be very much against it. I think the money would be wasted. There is a certain time factor in the rate of development in research which you cannot push too fast by dollars.

Mr. ADLERMAN. Coming back to the Bear Valley property in Idaho, how rich is that ore?

Mr. KLINE. I don't know quite what you mean by how rich.

Mr. ADLERMAN. What is the content of the columbium in those sands? Is it sands? I believe it is.

Mr. KLINE. It is a placer deposit. We speak of mineral content in terms of the amount per cubic yard. I can give you the figures in amount per cubic yard and annual production. The total estimated

annual production which might be realized in Bear Valley, assuming that they operated on a scale which would produce 10,000 yards a day, would be on the order of 144 tons a year of combined columbium and tantalum.

Mr. ADLERMAN. That is contained metal, or is that the metal itself?

Mr. KLINE. No, that is columbium-tantalum. That is the metal.

Mr. ADLERMAN. It is associated with other metals; is that right?

Mr. KLINE. That is correct. Incidentally, it is not in one mineral; it is in several minerals. In terms of the amount of these minerals, it would be on the order of 0.25 pounds a yard, or a quarter of a pound per yard. In addition to the columbium and tantalum, there would be a very appreciable production of uranium, a much larger production of thorium, and a very large production of rare earths and monazite.

Mr. ADLERMAN. Has a study been made on the metallurgy of that?

Mr. KLINE. Studies have been in progress for about 2 years on that, and I might say the success has been greater than we expected. I believe that when Mr. Porter testifies he will give you more recent developments on that than I have available.

Mr. ADLERMAN. That is the property operated by Mr. Porter?

Mr. KLINE. That is correct.

Mr. ADLERMAN. You mentioned some other areas. Are there any other areas that you know of right now in the United States that can produce columbium?

Mr. KLINE. I have named all of them here as I have gone along. I would say that we believe we have some good prospects. We have not done enough in the way of exploration and development to make any accurate estimate of the reserves, but we do have what I would call good prospects which we hope to be on early this spring and develop.

Mr. ADLERMAN. Is the Bureau of Mines under contract now to do exploration and expansion?

Mr. KLINE. Yes, we are.

Mr. ADLERMAN. Is that on a project basis?

Mr. KLINE. It is on a project basis. I would like to point out that, unfortunately, the Bureau has not had enough money of its own to undertake this work, and all that we have done on columbium and tantalum and the discovery of these properties has come from outside working funds. A very large percentage of it has been supplied by the Atomic Energy Commission, and DMPA has also given us several contracts to continue this type of work.

### FUNDS FOR RESEARCH

Mr. ADLERMAN. Do you feel that you are getting enough money through these other agencies to conduct full-scale investigations of the possible sources of columbium and tantalum, rutile, and so forth?

Mr. KLINE. No. If we had a greater allotment of funds, naturally we could increase the number of parties in the field, we could cover larger areas, and we could step up research. When Mr. Knickerbocker stated that he was satisfied with $75,000, I think he was speaking for his laboratory. That is only one of a number that we have. We could put other facilities on this job if the funds were available.

Mr. ADLERMAN. You are talking about metallurgy now?

Mr. KLINE. Yes.

Mr. ADLERMAN. I am talking about exploration.

Mr. KLINE. As I stated, on exploration, if more funds were available we could have more parties in the field and cover greater areas.

Mr. ADLERMAN. Do you think it would pay off?

Mr. KLINE. All I can say is that it has to date.

Mr. ADLERMAN. Where could you expect to secure those funds other than from the Bureau of Mines itself? Outside of the Atomic Energy Commission and DMPA, is there any other group that might finance that?

Mr. KLINE. None that I know of.

Mr. ADLERMAN. Do you know what the budget calls for next year? Is it increased or decreased?

Mr. KLINE. I would rather not answer that question.

Mr. ADLERMAN. Do you know or don't you?

Mr. KLINE. Yes, I know, but I prefer not to answer it.

Mr. ADLERMAN. On research, I understand that there are a number of research contracts outstanding at the present time under DMPA. Who is familiar with that?

Mr. MOORE. I think I am, sir.

Mr. ADLERMAN. I have a list here of some 12 of these contracts. Is that the total of all of the research programs which have been instituted by the DMPA or GSA?

Mr. MOORE. I believe that is the total, yes. I have a copy of that list here.

Mr. ADLERMAN. I see the Bureau of Mines had an allocation of $375,000 for the investigation of ore reserves and evaluation of metallurgical beneficiation research on domestic ores. Does that include your $75,000?

Mr. KNICKERBOCKER. That is the item, sir.

Mr. ADLERMAN. That is over a 5-year period; is that correct?

Mr. MOORE. That is correct.

Mr. ADLERMAN. I notice that the United States Geological Survey has a $250,000 contract on columbium and tantalum for geological exploration for domestic deposits of columbium and tantalum metals. Is that on a program, too?

Mr. MOORE. That is on a 5-year basis, too.

Mr. ADLERMAN. That is $50,000 a year.

Mr. GREEN. I think that is the one the gentleman referred to before.

Mr. KAISER. That is the survey.

Mr. ADLERMAN. Do you feel that you require more money than that for the Geological Survey?

Mr. KAISER. We are spending a good deal more than that.

Mr. ADLERMAN. Out of Geological Survey funds?

Mr. KAISER. Out of Geological Survey funds; yes, sir. I understand that contract is up for standard review at the end of 2 years, which is next fall.

Mr. KLINE. Mr. Adlerman, may I make a correction of your impression, which may be false, from my earlier statement. You asked me if the Atomic Energy Commission was financing the columbium and tantalum work, and I said, "Yes," but they are doing so only incidentally. It is not specifically columbium and tantalum work. We are looking for fissionable minerals, and they occur with fissionable minerals, so it is only incidental to that program.

Mr. ADLERMAN. There is nothing classified in these?

Mr. MOORE. No.

Mr. ADLERMAN. I will offer for the record two tables. A is "Domestic research contracts," and B is "Projects under active consideration."

(The document referred to follows:)

GENERAL SERVICES ADMINISTRATION,
EMERGENCY PROCUREMENT SERVICE,
*Washington, D. C., February 19, 1954.*

Mr. GEORGE HOLDERER,
*Interior and Insular Affairs Committee,*
*Senate Office Building, Washington, D. C.*

DEAR GEORGE: Attached are two lists of research contracts about which you inquired by telephone on February 17. List A contains the identity of contracts already entered into and list B includes projects which are now under active consideration.

Of course you realize that these two lists do not comprise the total of our effort to stimulate the research and development of new processes for the production of metal. From time to time during the past several years, when the urgency of the need for a particular material justified it, we entered into contracts with producers for commercial-scale plants based upon processes which under ordinary conditions would not have been considered as fully proved.

Instances of this are the National Lead Co. project at Fredericktown, Mo., for the production of nickel, cobalt, and copper by the high-pressure, high-temperature leaching process; the Calera project in Utah for the production of cobalt by the same process; Manganese Chemicals Corp. in Minnesota for manganese concentrates to be produced by the ammonium carbamate process, and the Hanna Nickel contract at Riddle, Oreg. The amount of money required to undertake these projects exceeded $40 million for plant alone.

If you need any more information, please call us.

Very truly yours,

JOHN G. FORD,
*Acting Chief, Contracts Administration Branch, Materials Division.*

*A. Domestic research contracts*

| Contract No. | Contractor | Address | Commodity being researched | Total amount committed | Remarks |
|---|---|---|---|---|---|
| DMP-23 | National Academy of Sciences | Washington, D. C | Various | $100,000 | General research on metallic and nonmetallic minerals and low-grade ores. |
| DMP-39 | National Lead Co | New York, N. Y | Brookite | 20,000 | For ultimate use as welding rod coating (terminated 1953). |
| DMP-86 | E. S. Nossen Laboratories, Inc | Paterson, N. J | Manganese | 517,000 | Beneficiation of Aroostook County, Maine, ores to produce manganese dioxide. |
| DMP-35 | Southwestern Engineering Co | Los Angeles, Calif | Manganese, cobalt, and nickel. | 250,000 | Commercial utilization of various manganese wad and other ores, and cobalt and nickel deposits. |
| DMP-22 | U. S. Bureau of Mines | Washington, D. C | Beryl | 150,000 | Development of means to recover beryl from pegmatites of the Kings Mountain area of North Carolina. |
| DMP-33 | do | do | Columbium and tantalum. | 375,000 | Investigation of ore reserves evaluation and metallurgical and beneficiation research (domestic ores). |
| | U. S. Geological Survey | do | do | 250,000 | Geological exploration for domestic deposits of columbium and tantalum metals. |
| DMP-24 | Mangaslag, Inc | Fort Worth, Tex | Manganese and ferromanganese. | [1] 2,600,000 | Experimental semicommercial pilot plant for proving process for recovery of manganese and/or ferromanganese from open hearth slag. |

[1] For purchase of 13,000 light tons of ferro.

*B. Projects under active consideration*

| Contractor | Commodity | Estimated cost | Remarks |
|---|---|---|---|
| Freeport Sulphur Co. | Nickel and cobalt | $3,250,000 | Pilot plant in Louisiana to test process for the production of nickel and cobalt metal from laterite ores. |
| Bethlehem Steel Co. | do | 5,000,000 | Pilot plant for production of nickel and cobalt from laterite ores. |
| Horizons Titanium Corp. | Titanium | 500,000 | Pilot plant to test new electrolytic reduction process. |
| Monsanto Chemical Co. (National Research Corp.). | do | 1,500,000 | Pilot plant to demonstrate a new process involving the use of sodium as a reduction agent. |
| Western Pyromet Corp. | do | (1) | Proposal to use one unit of old Kaiser Magnesium Co. plant in California, now a part of the National Industrial Reserve, to demonstrate feasibility of converting such equipment to titanium production. |
| U. S. Bureau of Mines | Selenium | 100,000 | Extraction of selenium from seleniferous tuffs and vanadium-bearing shales. |

[1] Not determined.

Mr. MOORE. I would like to make a correction on the second list, in the last item for the Bureau of Mines, on selenium. Instead of $33,000 it should be $100,000.

Mr. KNICKERBOCKER. I would like to say that the columbium resources in the Arkansas area with which we are dealing at Rolla must be considered as a byproduct of the titanium metal production. Our research work at this time deals with the standard Kroll process, which necessitates the production of titanium tetrachloride. The columbium is separated in the making of that chloride. It is a step which is being developed, a standard method for the production of titanium metal. I have no proof of this, but I think personally that there will be considerably more columbium produced as a byproduct of the present method for the production of titanium metal. Rutiles from all over, from Florida, from Australia, which we have analyzed at Rolla, Mo., contain small amounts of columbium. All of them do. That will be recovered as a byproduct in the standard titanium production process.

We are also attempting to develop cheaper methods for the production of titanium metal. The research must be extended to the possibility of other methods of production of titanium. So, there is no competition between columbium and titanium so far as the extractive process is concerned. They come together. They will be produced together to the greatest extent.

Mr. ADLERMAN. Could the rutile deposits in Arkansas, Idaho, and, you say, Florida, be used in the manufacture of the titanium metal?

Mr. KNICKERBOCKER. They are being used today by National Lead.

Mr. ADLERMAN. In addition to the ilmenites?

Mr. KNICKERBOCKER. No; the rutile. The only production plant that I have been through—Mr. Ralston and Mr. Blue probably know more about that than I—is the Henderson plant of National Lead where they are using rutile from all over the world—Australia, Florida. They also have a lease on part of the property in Magnet Cove.

Mr. ADLERMAN. Are any of them using ilmenite at the present time? Is Du Pont using ilmenite or rutile?

Mr. BLUE. Du Pont is using a mixture. It is a titanium mixture that they recover which is partly ilmenite, partly rutile, and partly another form, called leucoxene.

Mr. ADLERMAN. I don't believe we have touched on cobalt at all so far, have we, Mr. Kline?

COBALT RESOURCES IN UNITED STATES

Mr. KNICKERBOCKER. I believe they asked me to say something about cobalt resources in Missouri.

Mr. ADLERMAN. Cobalt resources in the United States. Are you familiar with them?

Mr. KNICKERBOCKER. I am not familiar with that.

Mr. ADLERMAN. Mr. Kaiser, are you familiar with the cobalt deposits in the United States?

Mr. KAISER. I don't think I could make a statement on that from the point of view of resources; no, sir.

Mr. ADLERMAN. What are our known resources, as far as you know?

Mr. KAISER. I know absolutely nothing, sir, about the actual commercial sources. I should think the Bureau of Mines people might make suggestions which would be much better than mine.

Mr. ADLERMAN. Mr. Ralston, could you tell us anything about the cobalt reserves in the United States?

Mr. RALSTON. Not being a specialist on that, I have only generalities that I can give you. For some years we have been producing cobalt from a pyrite deposit in Pennsylvania which is treated down at Wilmington. There is a very acceptable amount of cobalt there. The main value of the ore is for its sulfur and iron, but they are recovering a certain amount of cobalt from it, and small amounts of other metals that occur in not much more than traces are recovered at Wilmington.

The number of places where marginal or near economic cobalt occurs is very few. The Blackbird district of Idaho is being worked by the Calera Mining Co., who have an extraction plant at Salt Lake City, going about two-thirds of capacity, in trouble a good deal of the time, but working. As it is the first of that type of plant that ever has been built, naturally it is going to have some period of time getting on to its feet and to stop stumbling. In southeast Missouri in the Fredericktown area, another well-known old area went through World War I and World War II with ineffective efforts to extract cobalt, but now during the Korean situation greater effort was made and it is to be worked by the National Lead Co., who have most of the producing area; although not all of it.

In each of these cases the annual production is appreciable, but nothing like meeting the demand. The Salt Lake plant is expected to put out I think 2 million pounds a year, and the Missouri plant—how many?

Mr. KNICKERBOCKER. A little over a million.

Mr. RALSTON. That would be about 3 million, compared to our using 12 million pounds a year. I say it is an appreciable fraction.

RESEARCH FOR EXTRACTION OF COBALT

Mr. ADLERMAN. I notice in our testimony in the stockpile report on page 91, part I, there was a statement made, I think by Mr. Melcher, that the United States has large potential reserves of cobalt but that the lack of metallurgical extraction methods has prevented the country from becoming an important producer. In addition to that, I think we have had some recent indications that there will be a sizable production in Cuba from the Nicaro nickel project there. I think Mr. Gumbel is more familiar with that.

Mr. GUMBEL. When you say Cuba you have to distinguish between the Government-owned plant and the project of Freeport Sulfur. The current process used in the Government plant does not recover the cobalt. The cobalt goes out. But the Freeport Sulfur process, if it works, will recover the cobalt, as will also the Bethlehem Steel process.

Mr. ADLERMAN. Will Micaro revise its method of extraction to utilize the cobalt?

Mr. GUMBEL. We are working on it, you understand. We have a pilot plant and are working to try to extract it. If we discover the method, of course we will put it into the new plant if we can, if it will work into it.

Mr. ADLERMAN. It is just a question of working out the metallurgy?

Mr. GUMBEL. That is right, sir.

(Senator Malone returned to the hearing room.)

EXTENT OF DOMESTIC CONTRACTS FOR COLUMBIUM

Senator MALONE. Mr. Gumbel, we have established that about 11 contracts, I believe, have been let for columbium in Africa, but no contracts have been let—at least there was no one here who knew about contracts with domestic sources. Could you tell us about what is being done or planned to secure columbium from domestic sources?

Mr. GUMBEL. Yes, Senator. We have had only one project brought to our attention for domestic columbite. That is a firm in Missouri whose deposit is in Idaho. The name is Porter Bros.

Senator MALONE. You say the company is in Missouri?

Mr. GUMBEL. Yes; Porter Bros.

Senator MALONE. What is the address—St. Louis?

Mr. GUMBEL. St. Louis.

Mr. PORTER. It is Boise, Idaho.

Mr. GUMBEL. I am sorry.

Mr. PORTER. One of the smelters was in St. Louis, Mo.

Senator MALONE. We will call Mr. Porter a little bit later. What is the name of the company?

Mr. GUMBEL. Porter Bros.

Senator MALONE. Go right ahead. What has been done and what is planned for domestic production?

Mr. GUMBEL. They have an extensive deposit in Idaho. It not only contains columbite and tantalite, but it contains uranium, rare earths, and zirconium.

Senator MALONE. Uranium in what form?

Mr. GUMBEL. Do you know the oxide?

Mr. BRUSSOLO. Pentoxide form.

Mr. KLINE. It is in the form of euxenite.

Mr. GUMBEL. Of course, the problem was extraction. It has to be a chemical process. As I understand, two companies have succeeded in devising a process to extract all the different elements. The representative of the companies called on me, I guess about 3 weeks ago, Senator, and I was very happy to see him. They have worked out all their mining and milling completely, but there is still the question of the refining. I asked them to make their arrangements with the chemical company that would build the refinery and then to come in and we would discuss a contract with them.

PRICE ESTIMATED

Senator MALONE. Have you made any estimates of price that you might pay if necessary to encourage production?

Mr. GUMBEL. No; because they don't know what it is going to cost to refine. One of the things that they are working on now is to find out how much it will cost to extract.

Senator MALONE. How do you get at these contracts? Tell me more about it.

Mr. GUMBEL. Senator, I am afraid it is not a very scientific method, but it has worked. If a man has a mine, as you know, it is pretty hard to tell what it is going to cost him to produce, putting in all his equipment and everything. So, after the Bureau of Mines or the Geological Survey tells us he has a deposit and that it has so many tons of recoverable metals, we sit down with him and try to figure out what it is going to cost him to build a plant and what he will have to sell the material for to recover his investment. Then we enter into a contract with him which provides that we will purchase so much of the product at such-and-such price for so many tons. In any case, in order to protect the Government, because we have to accept his figures pretty largely, we put in a provision that we can terminate the contract when he gets his investment back. That is pretty much the way we do it.

Senator MALONE. On what basis do you fix the price?

Mr. GUMBEL. On his estimate of what it is going to cost him to produce.

Senator MALONE. You do let him make a couple of dollars; do you not?

Mr. GUMBEL. He gets his plant free. In other words, the price that we pay him amortizes the cost of his investment.

Senator MALONE. He then owns a plant with his mine worked out; is that it?

Mr. GUMBEL. No. It depends——

Senator MALONE. I thought you said you estimated how much he had.

Mr. GUMBEL. Of course, the contract cannot run beyond 1962 because the law does not permit us to contract beyond 1962.

Senator MALONE. That would be 8 years.

Mr. GUMBEL. That is right. If we contract for 8 years and then the mine is exhausted, then we have to give him a profit, but if he has a 40-year ore reserve and we pay out his plant in 8 years or 6 years, then we figure he will make his profit at the end of that time.

Senator MALONE. What is included in these costs? Managerial costs? If he is the manager himself, he gets paid, does he?

Mr. GUMBEL. Yes, sir.

Senator MALONE. In other words, everybody is on the payroll, and that enters into the costs, including the man who owns it?

Mr. GUMBEL. That is right. And royalties, if he has to pay them.

Senator MALONE. Then you let him come out even, with the plant paid for and with some ore left.

Mr. GUMBEL. Yes, unless there is some special reason to do better.

Senator MALONE. You can cancel the contract at the end of that time and just leave him sitting there with a plant, if you want to, even though he has some more ore left. What does he do then?

Mr. GUMBEL. Then we can renegotiate the price. Obviously, after he has paid out his capital investment——

Senator MALONE. You can, but you don't have to.

Mr. GUMBEL. We probably would if we were asked to.

Senator MALONE. But he is at your mercy. Isn't that it?

Mr. GUMBEL. I would not call it that. I am optimistic enough about mining to think that the person who has a good mine has something very valuable.

Senator MALONE. Suppose he did not have a good one, but he had a mine and had some ore left, and he came down and you seem to have enough of this metal at that time, what would you do then?

Mr. GUMBEL. Let me ask a question, Senator. Have you heard anybody complain——

Senator MALONE. Yes, I have.

Mr. GUMBEL. That our deals were too hard?

Senator MALONE. Yes. There is one in town right now who is broke. I don't need to mention names. He is over there with you.

Mr. GUMBEL. Today?

Senator MALONE. Right soon, right recently. I can dig you up plenty of them, if that is what you want.

Mr. GREENE. We don't want it.

Senator MALONE. I myself think you would be terribly embarrassed, so I think we had better talk about what you are going to do.

Mr. GUMBEL. Senator, our impression is that most people who have one of these contracts are pretty well pleased with it.

Senator MALONE. I don't know of any.

Mr. GUMBEL. I think we could bring some of them in.

Senator MALONE. The uranium boys are very well pleased, except they can operate only 3 or 4 months a year without going into a bracket where they can't pay the stockholders any money. They have some troubles, too.

Mr. GUMBEL. That is the Atomic Energy, Senator.

Senator MALONE. If you want to talk about manganese and zinc and lead, I will bring you back and we can talk about that.

Mr. GUMBEL. Senator, I cannot help but feel——

Senator MALONE. I am asking you a question now. Are they or are they not at your mercy at the end of this time when the plant is paid for?

Mr. GUMBEL. No; I don't think they are at our mercy.

Senator MALONE. Tell me why they are not.

Mr. GUMBEL. Because they could still sell their output.

Senator MALONE. Can they?

Mr. GUMBEL. Certainly. They have the plant paid for.

Senator MALONE. All right, but suppose it is like zinc and lead now, where you financed England and other foreign nations to build up a stockpile and then they used it to break the market.

Mr. GUMBEL. We are still buying zinc at a good deal above the market.

Senator MALONE. What are you paying for it at the moment?

Mr. GUMBEL. I think some of the contracts go up to 17½ cents.

Senator MALONE. To whom are you paying that?

Mr. GUMBEL. The producers.

Senator MALONE. To whom?

Mr. GUMBEL. American Zinc & Lead.

Senator MALONE. Where?

Mr. GUMBEL. Here in the United States, in Missouri. You have all the contracts, Senator.

Senator MALONE. Yes; we have, and you are paying more for contracts in Africa than you are paying here, a maximum of more money, if I remember correctly. You can check that. That is true, is it not?

Mr. GUMBEL. I am not sure, Senator. I would have to check it.

Senator MALONE. If you are not sure, the chances are it is true.

Let us bring this thing up to a head again. You sit down with a fellow, and you estimate how much his mill is going to cost, and you make a contract. Suppose his estimate is under what it costs him, what do you do then?

Mr. GUMBEL. I doubt very much that anybody does that.

Senator MALONE. That does not have anything to do with the question. I am asking you a question. What do you do then?

Mr. GUMBEL. We do not write this thing up and say, "Here is your contract." We sit down over a period of time and negotiate with them.

Senator MALONE. I understand that.

Mr. GUMBEL. He presents his arguments, and we look at them and, if they are sound, we go along with him.

Senator MALONE. How do you know if they are sound? You do not see the property or, if you do, you cannot see underground.

Mr. GUMBEL. That is right. You have to take a lot on faith.

Senator MALONE. I lived with them for 30 years. An engineer trying to make all of his estimates ahead of time, before he has dug into the mine too far and before the milling operation is entirely perfected, is likely to be about 100 percent wrong at times.

Mr. GUMBEL. But, Senator, my experience has been that when a man gives his estimates to us as to what it is going to cost him to produce the stuff, if he makes any mistake it is in his favor.

Senator MALONE. That is what he aims to do, but suppose labor goes up or he has bad luck or he has a fire, what do you do if he is in the red?

Mr. GUMBEL. Specifically, Senator, the reason that I could not be here when you started and called on me was that I was with the Administrator, and we were renegotiating a contract where the contractor was unable to perform in accordance with the terms of the contract, under which we will give him about 4 cents a pound more than the contract calls for.

Senator MALONE. Who is the Administrator?

Mr. GUMBEL. Mr. Mansure.

Senator MALONE. What kind of ore was this?

Mr. GUMBEL. Zinc. Before we do that we want to talk to you about it to see that you won't beat us over the head because we have been too generous with him.

Senator MALONE. This will be the first time in history if you have been too generous with a domestic producer.

Mr. GUMBEL. Mr. Greene calls my attention to the fact that we have entered into contracts where the price was to be fixed after the plant got into operation and we knew how much production cost was going to be.

Senator MALONE. You knew how much the mill cost?

Mr. GREENE. We have such contracts.

Mr. GUMBEL. Also, Senator, we have escalation in these contracts in case the costs go up.

Senator MALONE. Do you ever fix the price on zinc, lead, or cobalt, or anything that you think might be even a generous price, and make contracts for that price?

Mr. GUMBEL. Yes, sir.

Senator MALONE. Have you ever done it for a domestic producer?

Mr. GUMBEL. Yes, sir.

Senator MALONE. Which metal?

Mr. GUMBEL. Cobalt, manganese.

Senator MALONE. What was your manganese price?

Mr. GUMBEL. Our manganese price is about $2.30 per short ton unit, against the world market of about 90 cents to $1.10.

Senator MALONE. You are paying more for some foreign manganese than you are for American manganese. I know that. I can look that up for you.

Mr. GUMBEL. I am sorry, I am not too well acquainted with those foreign contracts. You have them all.

Senator MALONE. You bring them back to us. Send them in.

Mr. GUMBEL. You have full information about it.

Senator MALONE. Don't you remember it?

Mr. GUMBEL. I wasn't at that hearing the entire time.

Senator MALONE. You have seen the contracts, haven't you?

Mr. GUMBEL. No; I am afraid I have not.

### UNIFORM PRICE

Senator MALONE. Let us get back to some idea of what you are going to do. You need cobalt, and you need columbium. What are you doing to get columbium? We have just had testimony that the price on foreign contracts was a set price and foreign producers contracted for that set price.

Mr. WILSON. That is right, except for relatively long deliveries. For deliveries extending over 6 months' time, if it was not for a spot purchase, if it was for delivery beyond June 30, 1955, we knocked off 5 percent. For the period June 30, 1955, to December 31, 1956, we knocked off 10 percent.

Senator MALONE. But you had a uniform price for all foreign producers?

Mr. WILSON. That is right.

Senator MALONE. You understand that is the way they are doing it?

Mr. GUMBEL. In columbite and tantalite, yes, sir.

Senator MALONE. What is the matter with that system for a domestic producer?

Mr. GUMBEL. Senator, until Mr. Porter came in with his new process, it did not seem likely that we were ever going to get any columbite or tantalite in the United States domestically.

Senator MALONE. Do you have some kind of uniform price under consideration?

Mr. GUMBEL. We have. This open-purchase contract applies, as you know, to both domestic and foreign.

Senator MALONE. The same price?

Mr. GUMBEL. Yes, sir.

Senator MALONE. That is a wonderful idea. Do you have any idea of the difference in wages and taxes?

Mr. GUMBEL. Yes, indeed.

Senator MALONE. What are they in Africa and out in Idaho?

Mr. GUMBEL. I am not too much——

Senator MALONE. I will quote them for you. They are $12 to $15 in Idaho, and they are about 50 cents to $1 in Nigeria.

Mr. GUMBEL. But, Senator, if you can't get the stuff, it doesn't make any difference how much you pay for it.

Senator MALONE. I am asking you now if you have under consideration offering a uniform price, as, for example, in uranium, so a man could go out and look for it and know he would not have to come in here and pay his board at some hotel for 3 months to negotiate a price.

Mr. GUMBEL. This present price is double the world market price.

Senator MALONE. That is the $5 price?

Mr. GUMBEL. That is right, against $2.50 previously.

Senator MALONE. Has anyone figured for you what you could do on our standard of living of wages and taxes?

Mr. GUMBEL. Senator, I am sorry, that was negotiated before I had anything to do with it. I presume that the thing was directed primarily to foreign columbite because, I repeat, nobody expected to get any and didn't think any was available domestically.

Senator MALONE. Has anybody in Washington ever thought about offering a price for something and letting the prospectors go to work?

Mr. GUMBEL. I believe that the DMEA——

Senator MALONE. What is that organization?

Mr. GUMBEL. That is the Department of the Interior, the Defense Minerals Exploration Administration.

Senator MALONE. Is it still in existence?

Mr. GUMBEL. Yes. There is the Director of it.

Senator MALONE. I will get to you in a minute.

Mr. GUMBEL. When we get domestic goods, like mica, even though it is very much higher, we pay about three times as much to the domestic producers as we do to the foreign producers. They can bring it in and we accept it.

Senator MALONE. Is that a set price?

Mr. GUMBEL. That is a set price all over the United States.

Senator MALONE. You do not have to come in and negotiate?

Mr. GUMBEL. No. We have a depot.

Senator, I might explain——

Senator MALONE. What about manganese?

Mr. GUMBEL. We have that, too.

Senator MALONE. What is the domestic price?

Mr. GUMBEL. The domestic price I think is $2.30 a short-ton unit.

Senator MALONE. What did you pay for the manganese over in Africa?

Mr. GUMBEL. If we bought any manganese from Africa now we would pay probably 90 cents to $1.10.

Senator MALONE. I am not talking about now. I am talking about when you were paying——

Mr. GUMBEL. Somebody else will have to answer that. I am not familiar with foreign manganese contracts.

Mr. WILSON. We haven't purchased any in Africa with Public Law 774 funds or ECA funds.

Mr. GUMBEL. Senator, I would also like to point out that we are paying $63.50 per short-ton unit for tungsten.

Senator MALONE. I happen to know why you are doing that. That is my bill. You have no choice.

Mr. GUMBEL. You mean your bill to extend the date. We were paying that a long time before you introduced your bill.

Senator MALONE. I am just informed—and I am not bringing this up for the sake of argument, but I have been listening to this stuff for about 5 months—that you had a contract over in Africa for zinc for 19 cents, made along toward the time that the price was sliding, and it is 10 cents per pound here now. If you will just look that up, I think you will find that is true.

Mr. GUMBEL. We will look that up.

Mr. WILSON. Senator Malone, we do not have a contract of that kind in Africa financed with Public Law 774 funds.

Senator MALONE. It is one of the ECA contracts?

Mr. GREEN. That is an ECA contract.

Mr. ADLERMAN. They also had a DMPA contract for 26,250 tons of lead at a floor price of 17.3 cents, and a maximum ceiling price of 20.09 cents. The contract was signed on August 29, 1952, and deliveries commenced January 1, 1954, and continued for 5 years, to the end of 1958. At the time that contract was entered into, in August 1952, the price of lead domestically was 15 cents.

Why was the floor price fixed at that time at that price?

Mr. GUMBEL. Again, I am asking from memory, Senator, and I would like to check it, but my recollection is that the commitment was made quite a while before the contract was actually signed.

Senator MALONE. You did not make any domestic commitments. You did not make any at 19 cents, did you?

Mr. GUMBEL. I wouldn't be surprised.

Senator MALONE. Did they run 5 years, or are they still running?

Mr. GREENE. On zinc we have some paying 17 cents still running.

Senator MALONE. Nineteen cents?

Mr. GREENE. No, I don't think we have any foreign zinc.

Senator MALONE. There is a man in town who could do pretty well on that, but he cannot do well on 10.

Mr. ADLERMAN. The contract termination was extended to 1960 without any price concession except I think a quarter of a cent, on May 13, 1953. When it was extended, the price domestically, in May, was 12½ cents a pound.

Mr. GREENE. I think that was brought up once before, Mr. Adlerman.

Mr. ADLERMAN. I know. I am taking this from our previous testimony.

Mr. GREENE. If you recall, Senator, at the previous meeting it was brought out at your hearing, sir, that the reason that was extended—it wasn't extended at his request; it was a force majeure, if I recall correctly. He invoked a force majeure provision. In other words, he had a contract right to enforce that provision, which he did. I think you will find in the testimony such a statement. I think I made the statement.

Senator MALONE. You made about a 10-year contract with him to start with then.

Mr. GREENE. I do not know how long it was, sir.

Senator MALONE. I do not find any such contracts with domestic producers.

Mr. ADLERMAN. It was a 6-year contract.

Senator MALONE. Do you?

Mr. GREENE. We have long-term contracts with quite a few zinc people; yes, sir. We have American Zinc of Tennessee. We have the A. S. & R. We have United States Smelting, and any number of zinc contracts.

Senator MALONE. I would like to send you the address of a couple of people who could use a contract like that.

Mr. ADLERMAN. I would like to point out another contract, Senator, which we covered in a previous hearing.

The Vulcan Mines of Peru, on a zinc contract for 13,680 tons, to be delivered over a 3½-year period at 4,500 tons per year. This was on April 30, 1953. The floor price was 17½ cents.

I don't know what the zinc price at that time was, but it was much under that, I believe.

Senator MALONE. That was after they broke the market with our money.

Now, let's get back to the subject here.

Mr. Gumbel, you are a very intelligent man, and I think a very honest man. I think you are doing the best job you can possibly do, and I do not want the record to indicate any other thing. But I do want the record to show that you fellows sit there and negotiate so that in the long run you are very sure that nobody out here in the domestic country makes any money to amount to anything. You take them one by one. You do not fix the price so a man can go out and prospect and find something, and fix it like the wheat price. We do not go to every farm and understand how much it costs to produce it and how much he gets per acre when we fix a wheat price. All this came about in the last few years, and we have hired people to sit back here and see that nobody gets any money out of it.

Mr. GUMBEL. Senator, no. I think I ought to explain this to you.

Senator MALONE. I think you should.

Mr. GUMBEL. As you know, there are different types of mining. For instance, copper is usually a very large enterprise, a few very large enterprises.

Senator MALONE. They are because the others are frozen out. It is free trade. They can ship in the amount of copper they need at a little lower price until the individual small producer is gone.

Mr. GUMBEL. That is the pattern of the industry.

Senator MALONE. That is right, that is the pattern.

Mr. GUMBEL. Whereas tungsten and manganese and chrome and mica are small mines.

Senator MALONE. Like small farms.

Mr. GUMBEL. Yes, exactly.

Senator MALONE. But you do not go and fix a different price for the wheat and corn, do you?

PRICE TO INSURE PROFIT

Mr. GUMBEL. No, sir. What we did was this: We tried to establish a price for these small operators that would yield them a generous profit and be able to produce to the maximum. Therefore, we set up these depots and we established prices which had no relation at all to the world price, which were substantially in excess of the world price.

That covers, as I mentioned, tungsten, manganese, mica.

Senator MALONE. What do we say as the foreign price for tungsten?

Mr. GUMBEL. We are not buying any foreign, but we could get it for $15 a unit now.

Mr. ADLERMAN. What did you pay before, though?

Mr. GREENE. $40, $50.

Mr. ADLERMAN. You paid some at $65.

Mr. GREENE. That was at the height, yes. We paid the market, I am told.

Senator MALONE. You bought some higher than you are now buying domestic?

Mr. GUMBEL. That was a different program, Senator. That was when the country was in a terrible squeeze.

Senator MALONE. The reason they are in a terrible squeeze is because it was handled up to then just like you are handling it now. We are going to be in another terrible squeeze, and that is the only reason I am spending all this time on this committee.

I would like to get them out of the squeeze just once. What steps would you take now, Mr. Gumbel, to provide the proper incentive for producers of columbium and cobalt?

Mr. GUMBEL. Senator, I think you would have an exceedingly difficult job trying to fix the price for columbite that would suit every possible producer.

Senator MALONE. I am not asking you to do that. Do it like this gentleman down here is operating. Fix a price that will bring it in. How would you go about it?

Mr. GUMBEL. I don't think we have enough information available to permit us——

Senator MALONE. You could pay at least as much. You could start with that.

Mr. GUMBEL. We are. We are doing that.

Senator MALONE. Good.

Then why do you not look up and see what the cost of production is where you pay at 75 cents or 50 cents a day for labor, use our machinery, and you pay no taxes, and you bring it in and take advantage of this market? Then go out in this country, where they pay all the taxes that they have money to pay, and they pay anywhere from $12

to $15 a day for labor. Why do you not start figuring on the differential in costs?

Mr. GUMBEL. Senator, I think we would be justified in paying five times the world market for columbite if we could get it.

Senator MALONE. You can get it. It has been testified here by a man who knows his business.

Mr. GUMBEL. Senator, people are not usually loath to come to the General Services or the DMPA, if they have a deposit, and ask for help. As far as I know, we have never had anything but Porter Bros, come to us and say they had any columbite.

Senator MALONE. Because they do not think there is any use. Why do you not fix a price on these things that you can accept it and pay for it, and see if you do not get some results?

Mr. GUMBEL. You have to have some basis.

Senator MALONE. You have got it right here in this expert testimony.

Mr. Kline, how long have you known there were deposits out there?

Mr. KLINE. Not more than 2 years, Senator.

Mr. GREENE. If I understood Mr. Kline's testimony, he also said that there is a metallurgical problem. If anybody comes in to GSA, we are happy to speak to them.

Senator MALONE. Now we are simply asking you: What are you going to do to establish a market for columbium now that we know there is a possibility for domestic production?

Mr. GUMBEL. I would have to study it. I notice that Dr. Kline says that large potential reserves exist in the United States, but await the development of successful beneficiating methods and metallurgical extractive processes.

Senator MALONE. How do you think you arrive at these processes? If you offer a price for it, you will have every metallurgist in the country working on it.

I am not saying this definitely as yet, because the committee has not studied the testimony, but it may be possible that everything we need to fight a war or live in peace can be found and produced in the Western Hemisphere, considering replacements and substitutes. Will you help us try to do it?

Mr. GREENE. I think it is our duty to do it.

Mr. Porter?

## STATEMENT OF ROBERT P. PORTER, PRESIDENT, PORTER BROS. CORP., BOISE, IDAHO

Mr. PORTER. In answer to your telegram, Senator, I flew in from Boise last night. I was out at our plant.

Senator MALONE. Before we start, Mr. Porter, we are glad to see you. You are with Porter Bros. Corp. Just identify yourself for the record.

Mr. PORTER. I am R. P. Porter, president of Porter Bros. Corp.

Senator MALONE. We heard you before, did we not?

Mr. PORTER. Yes, in Salt Lake City, Utah.

Senator MALONE. That interested me very much, because you had discovered some uranium.

Mr. PORTER. Yes.

Senator MALONE. And you have also discovered some columbium and tantalum.

You have heard the testimony. Speaking as chairman of the committee, I am intensely interested to know what we are offering as an incentive price, not only on columbium and tantalum, but cobalt and any other strategic and critical mineral and material.

Mr. PORTER. I will bring you up to date since you were in Salt Lake.

We have moved one dredge on the property, and we are waiting for the winter weather to pass so we can get it erected ready for operation.

Senator MALONE. Will you describe your property as to location?

Mr. PORTER. Our property is located 95 miles northeast of Boise, Idaho.

Senator MALONE. Within the area Mr. Kline described?

Mr. PORTER. Yes. It is the same Bear Valley project. It comprises 11,500 acres, of which we have closely drilled approximately 900 acres, and generally drilled about 3,000 acres.

In the 900 acres we have developed 61 million cubic yards of dredgeable material, and the generally prospected ground has a potential of another 137 million yards.

Senator MALONE. When you speak of yards——

Mr. PORTER. That is cubic yards, dredgeable. It is an alluvial deposit.

Senator MALONE. What does it run in assays or the matter of metal?

Mr. PORTER. Our program is that we will put two dredges on the prospected area, and the two dredges will dig approximately 2½ million cubic yards a year. In digging this 2½ million cubic yards, we will produce between 800,000 and 900,000 pounds of euxenite. We take the black sand to a mill and divide it into component parts, the euxenite, monazite, ilmenite, and zircon.

The euxenite runs approximately 28 percent columbium-tantalum oxide; approximately 9 percent uranium oxide; and approximately 23 percent rare earths; and 24 percent titanium.

We ship the euxenite concentrate from Boise to a smelter to have the various metals extracted. With this production we contemplate producing between 220,000 to 240,000 pounds of 90 percent columbium-tantalum oxide.

Senator MALONE. A year?

Mr. PORTER. A year. And about 71,000 to 75,000 pounds of uranium, and 150,000 to 165,000 pounds of rare earth.

Senator MALONE. This is all from the same ground?

Mr. PORTER. All from the same ground.

Senator MALONE. It is a complex formation?

Mr. PORTER. Yes, it is a complex formation.

In addition, we will produce between 650 and 700 tons of monazite per year.

Senator MALONE. Let me ask you, this is a dredging proposition?

Mr. PORTER. It is an alluvial deposit in a valley and is a dredging project.

Senator MALONE. There is no grinding involved, like hard rock?

Mr. PORTER. No.

From that point we ship to a smelter, where it will be reduced to its component parts, and that is what I wanted to report and why I am here. We sent concentrates to a number of locations, to Mallinekradt

Chemical Co., to Fansteel Metallurgical Co., United States Bureau of Mines at Albany, and the United States Bureau of Mines at Raleigh, N. C., and each one has been working on a separate method of extracting the oxides.

We now have that all completed, and know what we can do. We will make a 90 percent product with not more than a 10 percent loss.

The production on area A, which we call the first area, would be from about 24 to 25 years.

Senator MALONE. This is that 900 acres you are talking about?

Mr. PORTER. Yes.

Senator MALONE. That would last you 25 years?

Mr. PORTER. Twenty-five years at the proposed production rate.

Senator MALONE. At that rate?

Mr. PORTER. Yes.

Our shore plant, where we take the dredge product and separate it, is designed for an additional increase of 30 percent at any time without additional plant. In other words, we could put another dredge on and the shore plant would not have to be added to. But at any time under an emergency, the property is so proven that it means only putting equipment on to double the production.

Senator MALONE. These 2 dredges would run 3 shifts?

Mr. PORTER. Three shifts, 7 days a week, for 250 days a year.

Senator MALONE. In other words, you have to shut them down in certain periods for repairs?

Mr. PORTER. We are up at 6,300 feet elevation in the mountain.

Senator MALONE. You mean due to weather you shut down?

Mr. PORTER. Due to weather. If we had been operating this year we would have gone right on through, because the weather hasn't been too difficult.

Senator MALONE. But it freezes up, ordinarily, so you could not work?

Mr. PORTER. We work down to 25 below, but must close down if it gets colder for any length of time.

### INCENTIVES TO INCREASE PRODUCTION

Senator MALONE. Now, tell me for the benefit of the record, what have you to suggest in the way of getting production?

I am not talking about you exclusively because you have proven your deposit. There must be other deposits; don't you think?

Mr. PORTER. We haven't drilled them, but actually being the only firm out there who has this miniature plant, other property owners are submitting their property for us to drill or to do some work on, and we have done some panning on other properties, and we feel that there will be additional yardage available.

Senator MALONE. In this area?

Mr. PORTER. Yes.

Senator MALONE. Are there other areas out in the West?

Mr. PORTER. We hear of some down in New Mexico. I think there is one in Montana, but I am not sure. I haven't been on them so I could not say.

Senator MALONE. Do you think it might open up a little bit like uranium, if there was a fixed price which would give a profit in case

new deposits are found? Do you think there would be more deposits located?

Mr. PORTER. Yes, I do, but I want it clear that I talked to Mr. Gumbel and he specifically told me or told Mr. Skidmore, who is the secretary and treasurer of the company, that when we had everything together and knew what we were going to produce to come to him.

We have uranium in it, too, which is a negotiated price because it isn't in the raw. It will be the finished material. Mr. Gumbel stated he would then go over our costs and he would negotiate a contract. He said he did not know the length of time of the contract. He felt we would be allowed a 5-year amortization or he would request it from ODM, and we would be allowed a normal profit on our capital invested. We haven't completed our figures to submit to him as yet.

We were delayed on this because we did not know what the final products of the chemical plant would be.

Senator MALONE. You are in the mining business, and you seem to have money enough to go through and develop your property without any intermediate production or securing any money in the meantime, which is a rare thing for a miner in an unproven country. Generally speaking, and I suppose from what you have said there are many people in the area who have fairly good properties, who do not have the money to carry through and be independent of all the assistance or contracts.

Do you believe the method of negotiating a price after the property is proven provides sufficient incentive or should there be a price fixed, as for uranium, for example?

Mr. PORTER. We are in a different position. We are not only going to have the raw euxenite, but we are going to go through the chemistry and come up with the finished product, which is a different situation. I would think a price might be established for the raw material which would permit a small miner to operate.

Senator MALONE. And he would know what he was going to get.

Mr. PORTER. Yes. I know they might not have the funds to put in the shore plant.

Senator MALONE. What do you call the shore plant?

Mr. PORTER. The shore plant is the electrostatic and magnetic plant.

Senator MALONE. For separating?

Mr. PORTER. For separating the various crystals, which are in the black sands.

Senator MALONE. How much do you estimate a plant like that would cost?

Mr. PORTER. We have an estimate of it, putting the dredges on and an estimate for the plant itself, of $1,300,000.

Senator MALONE. Even if a small miner had the money, each man wouldn't put one of his own on anyway.

Mr. PORTER. No. I think maybe if he had some specifications on his euxenite, for instance, I do feel that it can be produced by dragline methods as well as dredging, on small acreage. If there was a price for euxenite f. o. b. where he could handle it and send it to a mill and have it beneficiated and then to the smelter, I think more of them would try it.

Senator MALONE. You have heard the discussion on the foreign price, $5.40 for contained columbium per pound. What do you think

the price might be as a real incentive to develop not only the known areas but for prospectors?

Mr. PORTER. I wouldn't know how to put it on columbium and tantalum because I don't know what the AEC would pay you for uranium, and they are both in that same little crystal. I think it would have to be a joint price in order to establish it.

I would hope the domestic would get more than the foreign.

Senator MALONE. It has been a hope so far, but at least we can discuss it. Just some rough idea.

Mr. PORTER. Senator, actually I would not know. You can't tell from the schedule on uranium what 9 percent uranium product in the raw is worth. I can't. I can't read the table that high.

Senator MALONE. Let us get at it from another angle. There must be columbium in the United States where there is no uranium. They do not necessarily go together, do they?

Mr. PORTER. No; only in properties like ours, that I know of.

Senator MALONE. I will put that question to Mr. Kline.

Mr. KLINE. There are a number of other properties where uranium does not exist.

Senator MALONE. In this country?

Mr. KLINE. That is right.

Senator MALONE. So if you put a price on columbium where you have no uranium—if you have uranium you are just that much better off—and put in a plant like yours and separate it, like gold and copper. Gold helps pay some of the copper separation. But there are copper properties that run without very much gold. Do you think it would be a good idea to do just what was done for the foreign people—set a reasonable price and post it up there?

Mr. PORTER. I think it would be very advantageous, but right now I wouldn't want to give my idea of what the price would do.

Senator MALONE. Would you do a little figuring on it for us?

Mr. PORTER. Yes, I would.

Senator MALONE. If there were a fixed price, and someone came in with a property that could not be worked with the set price, then that could be a negotiated price, could it not? That has been done before.

Mr. PORTER. Yes.

### TAX CONCESSIONS AS INCENTIVE

Senator MALONE. We also need tax concessions as an added incentive.

Mr. PORTER. As for taxes, counting our State taxes out there and our mines-metals tax, plus our Federal tax, it is 60 percent of our net, which is quite a hunk off anybody. We do get the 15-percent depletion.

Senator MALONE. That would depend on your rate of production, would it not? In other words, you might run into a year when it would run up as high as 88 percent.

Mr. PORTER. I was not speaking about the individual; only the corporation.

Senator MALONE. How high does the corporation tax go?

Mr. PORTER. Fifty-two percent. There is an 8 percent State tax and 3 percent mines-metals tax in the State of Idaho. That makes

another 11 percent. The State tax may be applied in computing the Federal tax, so the average tax is about 61 percent.

Senator MALONE. It gets down to where we have to give only a minimum of time to be sure you get away with nothing.

Mr. PORTER. If you get a little overpaid Uncle Sam is going to take care of you with that 60 percent.

Senator MALONE. Now you are coming into something that makes sense. In other words, if the price to the domestic producer happens to be a little high, they catch him as he goes out the door, do they not?

Mr. PORTER. Yes. If it is a partnership the individual partner gets it worse than a corporation.

Senator MALONE. But if he lives in Nigeria, they do not get him, do they? Or do they? Could you answer that?

Mr. WILSON. No, I cannot.

Senator MALONE. That might be a good thing to look up.

Mr. ADLERMAN. The money made abroad is not taxable.

Senator MALONE. I see in the Ways and Means Committee there is a bill to write off more of the taxes on foreign investments. I am allergic to that kind of business. We need some incentive to develop our domestic ores so that we are prepared for any emergency.

Do you have any other remarks, Mr. Porter?

Mr. PORTER. No, I haven't.

Senator MALONE. Mr. Porter, we appreciate your appearance here very much. If you have anything more that you want to offer the committee, we would appreciate it.

Mr. Mittendorf and Mr. Ralston, I always feel better when I see him in a crowd of engineers, and you have a good reputation, yourself.

Would you like to give the committee some information on the exploration contracts that we might have on columbium?

## STATEMENT OF CLARENCE O. MITTENDORF, ADMINISTRATOR, DEFENSE MINERALS EXPLORATION ADMINISTRATION

Mr. MITTENDORF. I am Clarence Mittendorf, Administrator of the Defense Minerals Exploration Administration.

Senator, I have a brief statement prepared here on our activities on the columbium.

### AVAILABILITY OF GOVERNMENT FINANCIAL ASSISTANCE

Government financial assistance has been available for the exploration of columbium-tantalum since the establishment of the defense minerals exploration program earlier in 1951. The percentage of Government participation in the estimated cost of any approved project has been 90 percent versus the operators' 10 percent until November 3, 1953, when that ratio of participation was changed to 75 percent on behalf of the Government versus 25 percent to be furnished by the applicant.

Since columbium-tantalum minerals occur principally as byproducts of other minerals the exploration contracts which DMEA has approved are on deposits containing columbium-tantalum, in association with other minerals eligible for DMEA assistance such as beryl, monazite, rutile, tin, tungsten, and uranium. The DMEA has received 12

such applications, the most recent being during the month of June 1953. All of these applications have long since been processed.

Senator MALONE. Mr. Mittendorf, so the record will be clear, I am not sure I understood it, when you say the Government participated to the extent of 90 percent, now reduced to 75 percent, do you mean they advance the money for development?

Mr. MITTENDORF. I did not get the last part.

Senator MALONE. Do you mean your organization advances the money for development up to 90 percent, and now it is cut to 75 percent or what is the meaning of the Government participation up to 90 and now 75 percent?

Mr. MITTENDORF. At the beginning of the program and up until November 3, we would pay 90 percent of any project approved.

Senator MALONE. That means you would advance the money?

Mr. MITTENDORF. We do not advance it in the sense that we put it up. We reimburse the operator on a monthly basis. He must spend the money first. He puts in his voucher, and then we reimburse him.

Senator MALONE. At the end of the month, so he works month by month, and if he has a fund that revolves every 30 days he can operate with you?

Mr. MITTENDORF. That is right. We don't go into his back account and see if he has the money. We don't ask for a financial sheet. He can apply for an application. He has to say whether or not he has the money. He can hold up his part of it. This might amount to several thousand dollars, and we assume that he can carry the operation for 1 month.

Senator MALONE. If he does not carry it for the 1 month you are under no obligation.

Mr. MITTENDORF. If he does not commence work we are under no obligation.

Senator MALONE. The only thing you have done is to tie up some money on a contract. That is the only thing you have to be careful about.

Mr. MITTENDORF. We obligate the funds, but we are very lenient in that respect. If a man cannot get the money we will extend the starting date 6 months.

Senator MALONE. You judge your men. You know whether they are operators or not to start with.

Mr. MITTENDORF. That is right. The DMEA has received 12 applications, mostly during the month of June 1953.

Senator MALONE. You mean domestic applications?

Mr. MITTENDORF. Yes.

Senator MALONE. For columbium?

Mr. MITTENDORF. Yes. Of the 12 applications received, a total of 7 resulted in project contracts, with estimated aggregate cost of $207,581.

Senator MALONE. For all of the contracts?

Mr. MITTENDORF. Yes. Of which the Government agreed to contribute a total of $182,790.

Senator MALONE. Tell me at what price.

Mr. MITTENDORF. We don't take into consideration—You mean the price of columbium?

Senator MALONE. Yes.

Mr. MITTENDORF. No. We don't go into that.

Senator MALONE. You let him market his own?

Mr. MITTENDORF. That is right. We go into the physical, localized exploration. We differ from the Survey and the Bureau, who engage in the regional type. We go right into the specific project with the individual. We enter into a contractual arrangement with him.

Senator MALONE. You have engineers who check his prospects on the ground?

Mr. MITTENDORF. We do that through the Bureau and the Survey.

Senator MALONE. But I do not quite get where the end product goes. You make a contract with him to reimburse him on a monthly basis, but he has to sell his columbium then to whom? Anybody?

Mr. MITTENDORF. We don't worry about that.

Senator MALONE. You do not care about that.

Mr. MITTENDORF. No. We are going in with him taking a 90 percent risk up until recently, now it is 75, to find it.

Senator MALONE. Do you not have to know that he has a place where he can sell it or do you pay any attention to that?

Mr. MITTENDORF. Not too much, because my business is finding new reserves. I think that will take care of itself if we find it.

Senator MALONE. He can, then, sell it at this $5.40 a pound that applies the same as it does in Nigeria, I suppose. Who does he sell it to?

Mr. MITTENDORF. If he finds it, that is his problem. He has to find out where he can sell it, what sort of plant he needs and so forth. Our contracts with that man are very lenient. We put up that money. If he clocks, if he makes a discovery, he pays us back over 10 years. If he produces we have no obligation.

Senator MALONE. Over 10 years you continue that 1-month business, that amount that you advance for the month?

Mr. MITTENDORF. The total amount of money that we have advanced.

Senator MALONE. I understood you to say you did not advance it until he spent it.

Mr. MITTENDORF. I mean advance in the terms that the Government participated and put that much money into a project which was completed. At that point I will say that the Government has lent so much money.

Senator MALONE. Where do you put your money in in addition to reimbursing him month by month?

Mr. MITTENDORF. That is all.

Senator MALONE. Then you are never in. He spends the money and you reimburse him, and then he spends it again and you reimburse him. If he never hits anything, of course, then you are out some money, but if he does then he pays you back; is that it?

Mr. MITTENDORF. He pays us back only if he produces. He pays us back without interest, no obligation to produce, and when 10 years comes if he hasn't paid us back, all bets are off. His deal is forgiven.

Senator MALONE. If he had not paid it all back.

Mr. MITTENDORF. If he hasn't paid any of it back.

Senator MALONE. It could run to quite a bit of money at the end of 10 years if you never got any back.

Mr. MITTENDORF. Yes.

Senator MALONE. I guess you would quit before 10 years were up if you never got any back, would you?

Mr. MITTENDORF. We do not undertake projects ordinarily that require over 2 years to complete.

Senator MALONE. There is a 10-year limit on what you can extend your time on a contract. Is that what you meant?

Mr. MITTENDORF. There is a 10-year repayment period from the date of the contract provided a discovery is made.

Senator MALONE. I am trying to understand it myself. Suppose you reimbursed him for 3 or 4 months and you are in maybe 30 or 40 thousand dollars. Then he must reimburse you within 10 years.

Mr. MITTENDORF. If he produces.

Senator MALONE. If he doesn't produce any, he does not owe you any money?

Mr. MITTENDORF. He doesn't owe us any money.

Senator MALONE. He reimburses you only to the extent of his production?

Mr. MITTENDORF. That is right, without interest.

Senator MALONE. Do you let him keep anything to live on out of that business?

Mr. MITTENDORF. Our maximum royalty on his production is 5 percent. It is a sliding scale from 1½ percent to 5 percent.

Senator MALONE. Then he pays you back out of the 5 percent?

Mr. MITTENDORF. That is all.

Senator MALONE. Then the 95 percent he markets and can do anything he wants to do.

Mr. MITTENDORF. In his vest pocket.

Senator MALONE. You reimburse him every month?

Mr. MITTENDORF. While he is exploring. When he is through exploring and he goes into production he is on his own at that point.

Senator MALONE. You clarify the record when you get it so we will understand it. I think we do now.

Mr. MITTENDORF. Of the 12 applications received, I covered that, a total of 7 resulted in contracts; 3 of the 7 projects were located in Idaho, 2 in South Dakota, and 1 each in North and South Carolina. One of the projects, the smallest of any approved, has already been terminated without success.

Exploration work has been completed on two Idaho projects, but the outcome of these will remain indeterminate until final field reports are available. Three projects are still in force and considerably more work remains to be done.

One project, the largest of the seven, has been terminated and certified as discovered.

Senator MALONE. Has there been any production under your contracts?

Mr. MITTENDORF. No. As I say here, the smallest one is completed and was unsuccessful. The largest one is completed and was certified.

Mr. KLINE. I would be interested to know if it is going into production.

Mr. MITTENDORF. I understand they are designing the grids and hope to go into production.

Mr. KLINE. I understand they are going to go into production right away. It will take some time to get the equipment.

Mr. MITTENDORF. Concerning the five applications which we received and which did not result in any project contracts, I wouud like to point out that two of these were investigated in the field by the

Survey and the Bureau and they were considered not sufficiently promising to justify Government participation. Another applicant desired funds for a plant construction and was not eligible under the DMEA program. The fourth applicant failed to furnish sufficient information to enable us to process his application, and the fifth case was denied because of the metallurgical unfeasibiilty.

To sum up, we approved 7 of the 9 deals that we received which could fit in under the regulations. It is a much higher average on columbium and tantalum than we have throughout the program. Our average of rejections to approvals runs about 8 to 5, but in this case we ran 7 approvals to 2 denials.

Senator MALONE. It looks like a very good program.

Let me ask this question again: In the beginning when application is made, and filed properly, do you cooperate with the Bureau of Mines and the United States Geological Survey and your own engineers and get a report on the property?

Mr. MITTENDORF. That is right.

Senator MALONE. From both the Bureau of Mines and the United States Gelogical Survey?

Mr. MITTENDORF. Yes.

Senator MALONE. And then your own engineers go in and inspect it, do they?

Mr. MITTENDORF. None of my engineers leave Washington. They are all office men. They specialize more in the contractual relationships with the applicant, and we see the property through the eyes of the Bureau and the Survey.

Senator MALONE. That is a very good system. Suppose he produces some columbium, what does he do with it? You say you are not responsible for that, but do you know what he does with it? Is there any section of the Government ready to take it at any fixed price?

Mr. MITTENDORF. Of course we know that on many of these metallurgical studies were advanced. I rather take the position that if a man is willing to gamble his money, and he is putting in some money with the Government, he must have thought that out too. If he will put his money in, I will go ahead and gamble along with him.

Senator MALONE. That is true. No doubt, there would be plenty of market in the industrial field. We were discussing here a while ago the advisability of trying to have a ready market so that a man knew when he went out there that at least he would get a certain price. If he could get more than that, let him get it. At least there is a fixed price. There is a fixed price for foreign producers.

Suppose we have had a price confirmed to the foreign price and comparative on wages and taxes and other factors, would that help your game a little bit?

Mr. MITTENDORF. Well, I don't think there is any question that there is no incentive like a price incentive.

Senator MALONE. That is about all there is, and there is none now in a lot of things.

Mr. MITTENDORF. I wonder somewhat why our applications have fallen off since June, why we have not received any. I presume that that industry knows that there are metallurgical problems and probably they are holding back a little. Maybe they have not found the contract which will be suitable. It does disturb me that they have fallen off.

Senator MALONE. For how long have you been in this business?
Mr. MITTENDORF. All my life.
Senator MALONE. In the Government?
Mr. MITTENDORF. Well, I came back here. I have been in it since the inauguration of the Defense Minerals Exploration Administration, since its establishment. That has been a little over 3 years.

FIXED PRICE AS INCENTIVE TO INCREASED PRODUCTION

Senator MALONE. Well, you are a mining engineer, and you have had field experience, and now you have had this experience. Would you say it would be an incentive to have a price established on a domestic basis on relative cost to foreign price? Do you think that would be helpful? The prospector would not have to go through all this negotiation. He could spend his time and any money he could get his hands on, knowing that if he hit it he would at least be guaranteed a certain price. Would that be an incentive?
Mr. MITTENDORF. There is no question in my mind that it would be.
Senator MALONE. We need this, do we not?
Mr. MITTENDORF. We do need it; yes.
Senator MALONE. You think that we do?
Mr. MITTENDORF. Yes.
Senator MALONE. You evidently do or you would not be giving them these contracts.

Now, the testimony shows that we prospect very little in this country. The testimony also shows—and I cannot say it with certainty, but it certainly appears that we are not going to get anything out of Africa when the war starts, and you say we are getting ready to fight somebody, all the time—at least, we sell that idea. Do you not think it would be a good idea to get at some incentive domestic price for columbium, not to just try to hire somebody 5,000 miles away and keep them busy, knowing that they would be cut off as soon as war starts?
Mr. MITTENDORF. I certainly agree with you.
Senator MALONE. If you do not get it, it does not cost money the way the price is set.
Mr. MITTENDORF. I have had a little experience in Government, and the way it works is that once you set out the settings, so often you have to earmark the money and set it aside and take the average of what you have to commit, and then go to Congress and get the appropriation for it. Then you usually run into quite a little trouble.
Senator MALONE. This has not worked, the way you are working it now, the way you are doing it.
Mr. MITTENDORF. What has not worked?
Senator MALONE. We have not got any columbium.
Mr. MITTENDORF. I must confess that out of our program so far we have not made any phenomenal discoveries.
Senator MALONE. We are getting some columbium because we paid a very liberal foreign price. I am not complaining about the price they are paying. I am only talking about a comparative price. If it is worth $5.40 where the labor is about 40 cents a day, it ought to be worth a little more when it is $15 a day, would you not say, at a rough guess?
Mr. MITTENDORF. I would say as a rough guess, yes.

Senator MALONE. The only people you seem to argue with back here are people who live in America. You know them better.

Mr. MITTENDORF. That is true. How high it should be? I don't know. You were asking these other gentlemen questions about how that price is derived, and I did not get into that at all, but I happened to just come over from another job and I heard some men talk about that price. I think Sam Wilson is one man you know very well.

Senator MALONE. What does he say?

POSSIBLE INEFFECTIVENESS OF PRICE INCREASE

Mr. MITTENDORF. Sam was talking to a fellow and the other man said, "We ought to put $10 a pound on it." Sam said, "Yes, put $10 a pound on it. If you don't think you will get any, why don't you put $100 a pound on it?" "I don't think you will get much more."

Senator MALONE. What do you think we would get if we put $10 a pound on it, Mr. Kline? Given a year or two?

Mr. KLINE. I don't think you would get much more, Senator.

Senator MALONE. Not much more than you get at the present price of $5.40?

Mr. KLINE. Yes.

Senator MALONE. You think that that is enough?

Mr. KLINE. So far as I know, I think that from what we know about it, it can be produced for that.

Senator MALONE. Do you think you are going to get it? Is it your idea that there will be domestic sources developed producing a substantial amount of columbium?

Mr. KLINE. The amount of columbium we get, Senator, is going to be determined by the success we have in working out a byproduct metallurgy for it so that it will be recovered when we produce some other metal.

HIGH COST OF PRODUCING COLUMBIUM

Senator MALONE. Like Mr. Porter said, where he has other metals, including uranium?

Mr. KLINE. There are very very few known or even potential deposits where I believe it could be produced to stand on its own feet at any reasonable price.

Senator MALONE. What other metal do these deposits you know about contain which will help in mining and milling costs?

Mr. KLINE. Well, we covered a number of them in my testimony. I think there is a great future for the recovery of columbium from rutile because we are going to have to use rutile to manufacture titanium. Mr. Knockerbocker has testified about converting rutile to titanium tetrachloride, and how we have to take off the columbium.

Senator MALONE. There is a large amount of rutile in this country?

Mr. KLINE. Not as much as we would like, but we have a sufficient quantity of it to make it appear attractive as a source material for titanium and columbium. In addition to that, a much more likely source of titanium and columbium is the ilmenite.

Senator MALONE. Does it contain columbium?

Mr. KLINE. It also contains columbium.

Senator MALONE. I think you are getting hot now, because the testimony before the committee shows that there is enough ilmenite in the United States and southern Canada to run this Nation and hemisphere, probably, for 100 years.

Mr. KLINE. We pointed out a little earlier that one property alone is discarding enough columbium every year in waste products from that plant to last us for 4 years, at the present rates of consumption.

Senator MALONE. That is in Arkansas, bauxite and sand, and they are not saving the columbium?

Mr. KLINE. No.

COLUMBIUM AS A BYPRODUCT

Senator MALONE. It is an expensive process to save it?

Mr. KLINE. We think it will not be, as a byproduct. We cannot conceivably take the ilmenite unless we go after the columbium. If we can sell the ilmenite in the form of titanium tetrachloride and recover the columbium in the conversion process, we are just like the slaughterhouse that sells all their byproducts after they slaughter pigs.

Senator MALONE. All this testimony is going to be available to you, Mr. Kline, and it will be helpful to us if you will study it, if you have not already done so.

We are making a couple of thousand tons a year of titanium. Everyone in the business says they need a minimum of 150,000 tons. Now they are importing the ilmenite from India and the rutile from Australia, largely. However, a large company in the business of making ilmenite slag testified that 80 percent of the titanium, I believe, remains in the ilmenite slag. Is that what you have in mind?

Mr. KLINE. We do have a project where we are going to hope to be able to convert the ilmenite that is being thrown away in the Idaho dredging fields, into a titanium slag. The columbium will not be recovered from that source. The project that Mr. Knickerbocker is engaged in at Rolla is the extraction of columbium when they prepare the Arkansas ilmenite for titanium production by converting it to a tetrachloride.

Senator MALONE. Does that have the earmarks of success?

Mr. KNICKERBOCKER. I think so.

Senator MALONE. What about this ilmenite in the iron ore that the Kennecott Copper Co. is producing in Canada? Does that contain columbium?

Mr. KLINE. Not to my knowledge.

Senator MALONE. It has been investigated?

Mr. KAISER. We have analyzed that ore, Senator, and it has a small quantity, probably not recoverable.

Senator MALONE. Then it does not occur in all ilmenite?

Mr. KAISER. Just in some ilmenite.

Senator MALONE. Mr. Mittendorf, I am very much interested in your job there, and it seems that you know what you are doing. It is a gamble on the Government's part, but it is worth it for these critical metals.

Mr. MITTENDORF. That is right.

Senator MALONE. I think it is a reasonable program.

Mr. MITTENDORF. I am very enthused about it. We have entered now into 625 contracts in America and Alaska. Some of them are

responding very well. My guess is that about 3 out of 4 will result in failure, but 1 out of the 4 is liable to turn up something.

Senator MALONE. You are only operating in the field of strategic and critical materials, so that what you are gambling on is something that is worth it if you win.

Mr. MITTENDORF. That is right.

Senator MALONE. If there is anything you think would be helpful to us, we would appreciate it, either price or some other incentive, because it is incentive that gets mining done.

Mr. MITTENDORF. In my business I did not go into the economics of the project, that is, the costs-to-revenue relationships. I did not go into it too thoroughly. The engineer cannot divorce that from his mind. He must think of it, but it is not the governing factor with me.

For instance, if the lead-zinc property was marginal, I knew at the time that it couldn't hope to produce under the present market, but still, if there is a chance of making a significant discovery of ore which might be needed in periods of emergency, I go into the deal, as long as he is willing to go into the deal.

Senator MALONE. I think, from the testimony, that that is what your office was created for.

Mr. MITTENDORF. Yes.

Senator MALONE. Thank you very much.

Now, Mr. Ralston, do you have anything to offer? You have heard the testimony today and you know the objectives of the committee.

Mr. RALSTON. Just having heard Mr. Mittendorf, I whispered into his ear "Can his exploration incentives be applied to uranium ores, or are they special?"

He says "No; he can also take on uranium exploration."

Senator MALONE. That is if, in special cases, like Mr. Porter's, where there is a combination, you could make arrangements to do it?

Mr. MITTENDORF. Not necessarily. We go into uranium as such, and we have several projects on the plateau. We have approved 54 uranium projects already. We now have 31 in force where the work is going on.

Senator MALONE. Would you like to submit these projects on uranium for the record? We are very much interested in that field.

How many projects do you have altogether that are now alive?

Mr. MITTENDORF. We have 309 in force. We have approved 621; 309 are still going.

Senator MALONE. Is that the full list that you have with you?

Mr. MITTENDORF. Yes. We get this report out monthly, and I will send it up to your committee.

Senator MALONE. I think that you ought to file one as an exhibit. Then we will get it month by month and have one attached to it.

Mr. MITTENDORF. Would you like to take this one? It is marked up a little bit.

Senator MALONE. That will be exhibit No. 1 in Mr. Mittendorf's testimony.

(The document referred to was marked "Exhibit No. 1," as follows:)

DEFENSE MINERALS EXPLORATION ADMINISTRATION REPORT OF EXPLORATION ASSISTANCE APPLICATIONS FOR JANUARY 1954

*During January*

| | | |
|---|---|---|
| Applications in process as of Dec. 31, 1953 | 105 | |
| Applications received during January | 19 | |
| | | 124 |
| Contracts executed | 9 | |
| Applications denied | 6 | |
| Applications withdrawn | 3 | |
| | | 18 |
| Total applications in process as of Jan. 31, 1954 | | 106 |
| Applications approved and contracts prepared during January | | 8 |
| Contracts approved but not yet executed by applicant | | 11 |

*Stages of completion of applications "in process"*

| | |
|---|---|
| Applications in stage of preliminary analysis by Commodity Division Engineers, Bureau of Mines, and Geological Survey commodity specialists | 9 |
| Applications awaiting additional information from applicant | 11 |
| Applications with field team for onsite examination | 64 |
| Applications in final stages of processing: (a) Contracts prepared but not yet executed by applicant; (b) contracts or denial letters being prepared; (c) applications on which field-team reports have been received and final action is to be taken | 25 |

*Location of applications in process*

| | | |
|---|---|---|
| Base Metals Division | 6 | |
| Iron and Ferro Alloys Division | 12 | |
| Nonmetallic Minerals Division | 15 | |
| Rare and Miscellaneous Metals Division | 9 | |
| Chief Counsel's Office | 0 | |
| | | 42 |
| Field teams (for on-site examinations): | | |
| Region I | 0 | |
| Region II | 8 | |
| Region III | 13 | |
| Region IV | [1] 39 | |
| Region V | 0 | |
| Region VI | 0 | |
| Region VII | 4 | |
| Region VIII | 0 | |
| | | 64 |
| Grand total in process | | 106 |
| Amendments to contracts executed as of Dec. 31, 1954 | | 1,080 |
| Amendments to contracts executed this month | | 48 |
| Total | | 1,128 |

[1] 31 applications being processed within delegation of authority—region IV.

*Status of applications for exploration assistance through January*

| | |
|---|---|
| Total number of applications received | 2,060 |
| Applications approved and contracts executed | 621 |
| Applications denied | 950 |
| Applications withdrawn | 383 |
| Applications in process | 106 |

*Applications received during January 1954*

| Commodity | Number of applications | State | Estimated cost of project |
|---|---|---|---|
| Copper | 1 | Oregon | $23,412 |
| Mica | [1] 6 | Georgia (1), North Carolina (5) | 31,819 |
| Manganese | 1 | Montana | 7,840 |
| Tantalum-copper | 1 | Colorado | 25,000 |
| Tungsten | [1] 6 | Alaska (2), Colorado, Idaho, Montana, Utah | 539,721 |
| Uranium | 3 | Montana, South Dakota, Utah | 70,422 |
| Uranium-vanadium | [1] 1 | Utah | |
| Total | 19 | | 698,214 |

[1] No amount shown on 1 application.

*Contracts executed during January 1954*

| Name of operator | County | State | Commodity | Government part | Total value |
|---|---|---|---|---|---|
| George D. Schweigert | Custer | Colorado | Thorium | $2,599.20 | $2,888.00 |
| Lloyd P. Mock | Boulder | do | Tungsten | 6,676.50 | 8,902.00 |
| Johnson Bros. & Prime | do | do | do | 16,500.00 | 22,000.00 |
| N. E. Boe & James Van Gorder. | Jefferson | Montana | Copper | 13,365.00 | 26,730.00 |
| American Machine & Metals, Inc. | Granite | do | Manganese | 63,457.50 | 84,610.00 |
| Uranium Development Corp | Valencia | New Mexico | Uranium | 10,476.65 | 11,640.72 |
| Barn Gay Mining Co | Cleveland | North Carolina | Mica | 2,340.00 | 2,600.00 |
| Charlie B. Hensley | Jackson | do | do | 4,815.00 | 5,350.00 |
| Thornburg Mining Co | Grand | Utah | Uranium | 37,720.00 | 41,910.00 |
| Total | | | | 157,949.85 | 206,630.72 |

*Contracts terminated during January 1954*

| Name of operator | County | State | Commodity | Government part | Total value |
|---|---|---|---|---|---|
| Smith Mica Co | Clay | Alabama | Mica | $5,400.00 | $6,000.00 |
| H. R. and W. A. Scott and R. D. Vinck. | Gila | Arizona | Asbestos | 12,722.40 | 14,136.00 |
| Reed & Reed | Mohave | do | Lead-zinc | 10,000.00 | 20,000.00 |
| Ace Building & Roofing Supplies. | Greenlee | do | Manganese | 17,880.00 | 23,840.00 |
| Montana Mining Development Co. | Clear Creek | Colorado | Lead-zinc | 7,500.00 | 15,000.00 |
| Callahan Zinc-Lead Co | Gunnison | do | do | 15,305.00 | 30,610.00 |
| J. M. Smith and C. R. Rugg | Boulder | do | Tungsten | 18,300.00 | 24,400.00 |
| William Mulcahy | Jefferson | Montana | Lead | 2,546.15 | 5,092.30 |
| Alps Mining & Milling Co | Granite | do | Tungsten | 26,146.50 | 34,862.00 |
| Bowman Bros | Caldwell | North Carolina | Mica | 2,790.00 | 3,100.00 |
| Hoyle Bialock, et al | Cleveland | do | do | 2,970.00 | 3,300.00 |
| Hoyle Bialock, et al | do | do | do | 4,995.00 | 5,550.00 |
| Dixie Minerals, Inc | Jackson | do | do | 4,860.00 | 5,400.00 |
| Ray E. Bennett | Macon | do | do | 2,970.00 | 3,300.00 |
| Richard C. Angel | do | do | do | 4,770.00 | 5,300.00 |
| Balsam Mica Miners | Yancey | do | do | 2,466.00 | 2,740.00 |
| Bennett & Johnson Co | do | do | do | 6,300.00 | 7,000.00 |
| S. W. Presnell Mica Miners | do | do | do | 10,080.00 | 11,200.00 |
| Grigg & West Co | do | do | do | 8,685.00 | 9,650.00 |
| Belle Eldridge Gold Mines, Inc. | Lawrence | South Dakota | Lead-zinc | 5,800.00 | 11,600.00 |
| C. E. Weir | Custer | do | Uranium | 9,933.30 | 11,037.00 |
| Bullion Monarch Mining Co. | Piute | Utah | do | 24,957.00 | 27,730.00 |
| Bowles-Heflin Mining Co | San Juan | do | Uranium-Vanadium. | 17,049.60 | 18,944.00 |
| Total | | | | 224,425.95 | 299,791.30 |

TABLE I.—*Contracts executed and in force—commodity distribution*

| Commodity | Contracts executed in January 1954 | | | Contracts executed through Jan. 31, 1954 | | | Contracts canceled and terminated through January 1954 | | | Contracts in force as of Jan. 31, 1954 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Percent distribution of Government participation |
| Antimony | | | | $347,001 | $462,668 | 12 | $105,079 | $140,105 | 7 | $241,922 | $322,563 | 5 | 1.9 |
| Asbestos | | | | 579,881 | 644,311 | 19 | 500,641 | 556,267 | 13 | 79,240 | 88,044 | 6 | .6 |
| Beryl-mica | [1] $885 | [1] $984 | | 252,763 | 280,847 | 21 | 168,901 | 187,668 | 17 | 83,862 | 93,179 | 4 | .7 |
| Cobalt-nickel | | | | 913,237 | 1,263,792 | 7 | 20,621 | 22,912 | 2 | 892,616 | 1,240,880 | 5 | 7.0 |
| Columbium-tantalum | | | | 47,005 | 52,228 | 3 | 3,184 | 3,538 | 1 | 43,821 | 48,690 | 2 | .3 |
| Copper | 13,365 | 26,730 | 1 | 1,270,186 | 2,540,374 | 37 | 419,240 | 838,483 | 19 | 850,946 | 1,701,891 | 18 | 6.7 |
| Corundum | | | | 32,400 | 36,000 | 1 | 32,400 | 36,000 | 1 | | | | |
| Fluorspar | | | | 168,500 | 326,997 | 9 | 59,859 | 119,718 | 4 | 108,641 | 207,279 | 5 | .9 |
| Graphite | | | | 925 | 1,850 | 1 | 925 | 1,850 | 1 | | | | |
| Iron | | | | 278,400 | 556,800 | 3 | | | | 278,400 | 556,800 | 3 | 2.2 |
| Lead-zinc | | | | 5,242,870 | 10,492,447 | 155 | 1,228,578 | 2,463,859 | 69 | 4,014,292 | 8,028,588 | 86 | 31.6 |
| Lead-zinc-copper | | | | 2,371,766 | 4,743,532 | 38 | 409,760 | 819,519 | 14 | 1,962,006 | 3,924,013 | 24 | 15.5 |
| Manganese | 63,457 | 84,610 | 1 | 467,110 | 622,812 | 17 | 166,791 | 222,388 | 7 | 300,319 | 400,424 | 10 | 2.4 |
| Mercury | | | | 940,245 | 1,253,659 | 20 | 312,387 | 416,515 | 6 | 627,858 | 837,144 | 14 | 4.9 |
| Mica | [1] 8,730 | [1] 9,700 | 2 | 639,915 | 711,016 | 119 | 340,187 | 377,985 | 74 | 299,728 | 333,031 | 45 | 2.4 |
| Monazite | | | | 106,451 | 122,759 | 5 | 60,449 | 71,645 | 2 | 46,002 | 51,114 | 3 | .4 |
| Platinum | | | | 10,800 | 12,000 | 1 | | | | 10,800 | 12,000 | 1 | .1 |
| Rutile | | | | 15,675 | 20,900 | 1 | 15,675 | 20,900 | 1 | | | | |
| Sulfur | | | | 138,120 | 276,239 | 3 | 88,544 | 177,089 | 2 | 49,576 | 99,150 | 1 | .4 |
| Talc | | | | 29,267 | 32,519 | 1 | 29,267 | 32,519 | 1 | | | | |
| Thorium | 2,599 | 2,888 | 1 | 105,302 | 117,006 | 4 | 9,194 | 10,215 | 1 | 96,108 | 106,791 | 3 | .8 |
| Tin | | | | 423,208 | 470,231 | 5 | 16,200 | 18,000 | 1 | 407,008 | 452,231 | 4 | 3.2 |
| Tungsten | 23,177 | 30,902 | 2 | 2,336,770 | 3,115,692 | 85 | 770,836 | 1,027,781 | 46 | 1,565,934 | 2,087,911 | 39 | 12.3 |
| Uranium | 48,197 | 53,551 | 2 | 1,250,230 | 1,389,141 | 54 | 520,982 | 578,869 | 23 | 729,248 | 810,272 | 31 | 5.7 |
| Totals | 160,410 | 209,365 | 9 | 17,968,027 | 29,545,820 | 621 | 5,279,700 | 8,143,825 | 312 | 12,688,327 | 21,401,995 | 309 | 100.0 |

[1] Includes amendments increasing contract amounts.

TABLE II.—*Contracts executed and in force—State distribution*

| State | Region | Contracts executed in January 1953 | | | Contracts executed through Jan. 31, 1953 | | | Contracts canceled and terminated through January 1953 | | | Contracts in force as of Jan. 31, 1954 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Percent distribution of Government participation |
| Alabama | VII | | | | $140,958 | $256,620 | 4 | $5,400 | $6,000 | 1 | $135,558 | $250,620 | 3 | 1.1 |
| Alaska | I | | | | 919,114 | 1,154,740 | 13 | 103,224 | 171,548 | 3 | 815,890 | 983,192 | 10 | 6.4 |
| Arizona | IV | | | | 845,585 | 1,377,649 | 33 | 349,554 | 515,309 | 14 | 496,031 | 862,340 | 19 | 3.9 |
| Arkansas | VI | | | | 129,685 | 172,913 | 5 | 129,685 | 172,913 | 5 | | | | |
| California | III | | | | 1,390,794 | 1,988,963 | 35 | 589,752 | 765,759 | 17 | 801,042 | 1,223,204 | 18 | 6.4 |
| Colorado | IV | [1] $26,661 | [1] $34,774 | 3 | 1,733,352 | 2,790,948 | 83 | 504,629 | 780,539 | 43 | 1,228,723 | 2,010,409 | 40 | 9.7 |
| Florida | VII | | | | 15,675 | 20,900 | 1 | 15,675 | 20,900 | 1 | | | | |
| Georgia | VII | | | | 74,891 | 88,071 | 11 | 7,312 | 8,124 | 2 | 67,579 | 79,947 | 6 | .6 |
| Idaho | II | | | | 3,930,705 | 7,085,066 | 66 | 568,348 | 1,057,302 | 21 | 3,362,357 | 6,027,764 | 45 | 26.5 |
| Illinois | VIII | | | | 103,665 | 207,329 | 3 | 24,300 | 48,600 | 1 | 79,365 | 158,729 | 2 | .6 |
| Iowa | V | | | | 14,850 | 29,700 | 1 | 14,850 | 29,700 | 1 | | | | |
| Maine | VIII | | | | 40,140 | 44,600 | 1 | 40,140 | 44,600 | 1 | | | | |
| Michigan | V | | | | 284,096 | 568,193 | 1 | | | | 284,096 | 568,193 | 1 | 2.2 |
| Missouri | VI | | | | 330,189 | 503,761 | 7 | 48,334 | 96,669 | 5 | 281,855 | 407,092 | 2 | 2.2 |
| Montana | II | 76,822 | 111,340 | 2 | 1,247,815 | 2,007,533 | 56 | 556,813 | 955,335 | 28 | 691,002 | 1,052,098 | 28 | 5.4 |
| Nevada | III | | | | 1,004,336 | 1,679,880 | 34 | 124,507 | 184,367 | 12 | 879,829 | 1,495,513 | 22 | 6.9 |
| New Hampshire | VIII | | | | 27,909 | 31,010 | 4 | 23,850 | 26,500 | 3 | 4,059 | 4,510 | 1 | .1 |
| New Jersey | VIII | | | | 142,775 | 285,550 | 2 | 925 | 1,850 | 1 | 141,850 | 283,700 | 1 | 1.1 |
| New Mexico | IV | 10,477 | 11,641 | 1 | 630,135 | 1,196,197 | 10 | 203,868 | 352,975 | 6 | 426,267 | 843,222 | 4 | 3.4 |
| North Carolina | VII | [1] 8,730 | [1] 9,700 | 2 | 593,529 | 659,477 | 106 | 327,948 | 364,386 | 70 | 265,581 | 295,091 | 36 | 2.1 |
| Oklahoma | VI | | | | 78,000 | 156,000 | 1 | 78,000 | 156,000 | 1 | | | | |
| Oregon | II | | | | 113,237 | 160,983 | 6 | 56,390 | 85,187 | 3 | 56,847 | 75,796 | 3 | .4 |
| South Carolina | VII | | | | 47,802 | 57,593 | 1 | 47,802 | 57,593 | 1 | | | | |
| South Dakota | V | | | | 266,070 | 300,785 | 21 | 123,320 | 142,179 | 16 | 142,750 | 158,606 | 5 | 1.1 |
| Tennessee | VII | | | | 6,768 | 7,520 | 1 | 6,768 | 7,520 | 1 | | | | |
| Texas | VI | | | | 178,800 | 274,424 | 5 | 118,800 | 194,424 | 4 | 60,000 | 80,000 | 1 | .5 |
| Utah | IV | 37,720 | 41,910 | 1 | 2,265,040 | 3,861,721 | 56 | 482,842 | 668,322 | 20 | 1,782,198 | 3,193,399 | 36 | 14.0 |
| Vermont | VIII | | | | 180,671 | 223,582 | 4 | 180,671 | 223,582 | 4 | | | | |
| Virginia | VIII | | | | 43,825 | 67,850 | 2 | 43,825 | 67,850 | 2 | | | | |
| Washington | II | | | | 723,269 | 1,354,864 | 31 | 250,831 | 432,415 | 13 | 472,438 | 922,449 | 18 | 3.7 |
| Wisconsin | V | | | | 351,017 | 704,738 | 14 | 211,632 | 425,967 | 11 | 139,385 | 278,771 | 3 | 1.1 |
| Wyoming | IV | | | | 113,330 | 226,660 | 3 | 39,705 | 79,410 | 1 | 73,625 | 147,250 | 2 | .6 |
| Total | | 160,410 | 209,365 | 9 | 17,968,027 | 29,545,820 | 621 | 5,279,700 | 8,143,825 | 312 | 12,688,327 | 21,401,995 | 309 | 100.0 |

[1] Includes 2 amendments executed during January which increased contract amounts.

TABLE III.—*Contracts executed and in force—Regional distribution*

TABLE III.—*Contracts executed and in force—Regional distribution*

| Region | Contracts executed in January 1954 | | | Contracts executed through January 1954 | | | Contracts canceled and terminated through January 1954 | | | Contracts in force as of Jan. 31, 1954 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Government participation | Value of contract | Number | Percent distribution of Government participation |
| I | | | | $929,914 | $1,166,740 | 14 | $103,224 | $171,548 | 3 | $826,690 | $995,192 | 11 | 6.5 |
| II | $76,822 | $111,340 | 2 | 6,015,025 | 10,608,446 | 159 | 1,432,383 | 2,530,239 | 65 | 4,582,642 | 8,078,207 | 94 | 36.1 |
| III | | | | 2,395,130 | 3,668,843 | 69 | 720,379 | 962,366 | 30 | 1,674,751 | 2,706,477 | 39 | 13.2 |
| IV | [1] 74,858 | [1] 88,325 | 5 | 5,576,643 | 9,441,175 | 184 | 1,574,477 | 2,384,315 | 83 | 4,002,166 | 7,056,860 | 101 | 31.5 |
| V | | | | 916,033 | 1,603,416 | 37 | 349,802 | 597,846 | 28 | 566,231 | 1,005,570 | 9 | 4.5 |
| VI | | | | 716,674 | 1,107,098 | 18 | 374,819 | 620,006 | 15 | 341,855 | 487,092 | 3 | 2.7 |
| VII | [1] 8,730 | [1] 9,700 | 2 | 879,623 | 1,090,181 | 124 | 410,905 | 464,523 | 76 | 468,718 | 625,658 | 48 | 3.7 |
| VIII | | | | 538,985 | 859,921 | 16 | 313,711 | 412,982 | 12 | 225,274 | 446,939 | 4 | 1.8 |
| Total | 160,410 | 209,365 | 9 | 17,968,027 | 29,545,820 | 621 | 5,279,700 | 8,143,825 | 312 | 12,688,327 | 21,401,995 | 309 | 100.0 |

[1] Includes amendments increasing contract amounts.

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TABLE IV.—*Disbursements, by region and by month, month distribution through Jan. 37, 1954*

MONTH DISTRIBUTION THROUGH JAN. 31, 1954

| Month | Month-by-month disbursement | Cumulative disbursement data | Month | Month-by-month disbursement | Cumulative disbursement data |
|---|---|---|---|---|---|
| July 1952 | $12,125.62 | $12,125.62 | December | $347,056.64 | $5,141,288.35 |
| August | 64,764.53 | 76,890.15 | January 1953 | 451,802.16 | 5,593,090.51 |
| September | 238,885.60 | 315,775.75 | February | 305,978.26 | 5,899,068.77 |
| October | 229,621.57 | 545,397.32 | March | 358,390.45 | 6,257,459.22 |
| November | 211,127.61 | 756,524.93 | April | 306,482.97 | 6,563,942.19 |
| December | 217,054.64 | 973,579.57 | May | 182,194.01 | 6,746,136.20 |
| January 1952 | 261,280.43 | 1,234,860.00 | June | 331,219.20 | 7,077,355.40 |
| February | 245,613.20 | 1,480,473.20 | July | 301,141.12 | 7,378,496.52 |
| March | 231,786.38 | 1,712,259.58 | August | 384,541.11 | 7,763,037.63 |
| April | 298,113.56 | 2,010,373.14 | September | 312,607.92 | 8,075,645.55 |
| May | 346,528.97 | 2,356,902.11 | October | 387,113.53 | 8,462,759.08 |
| June | 329,879.73 | 2,686,781.84 | November | 242,030.86 | 8,704,789.94 |
| July | 318,734.92 | 3,005,516.76 | December | 312,964.32 | 9,017,754.26 |
| August | 307,488.00 | 3,313,004.76 | January 1954 | 279,962.78 | 9,297,717.04 |
| September | 316,037.14 | 3,629,041.90 | | | |
| October | 714,966.75 | 4,344,008.65 | Total through January 1954 | 9,297,717.04 | |
| November | 450,223.06 | 4,794,231.71 | | | |

REGIONAL DISTRIBUTION CUMULATIVE THROUGH JANUARY 31, 1954

| Region: | *Regional disbursements* | Region—Continued | *Regional disbursements* |
|---|---|---|---|
| I | $670,611.95 | VI | $402,170.98 |
| II | 2,664,446.11 | VII | 513,698.67 |
| III | 1,162,184.61 | VIII | 284,284.35 |
| IV | 3,024,163.26 | | |
| V | 576,157.11 | Total | 9,297,717.04 |

TABLE V.—*Terminated and certified projects*

| Commodity | Projects terminated (including certifications) through Jan. 31, 1954 | | | | Certified projects which had been terminated through Jan. 31, 1954 | | | | Certified projects which were in force as of Jan. 31, 1954 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | Government participation | Value of contract | Amount Government participation spent | Number | Government participation | Value of contract | Amount Government participation spent | Number | Government participation | Value of contract | Amount Government participation spent |
| Antimony | 6 | $103,099 | $137,465 | $47,306 | 1 | $12,060 | $16,080 | $8,086 | | | | |
| Asbestos | 12 | 466,351 | 518,167 | 201,786 | 1 | 19,575 | 21,750 | 19,575 | 1 | $10,800 | $12,000 | $10,611 |
| Beryl-mica | 14 | 110,852 | 123,169 | 60,516 | 7 | [1] 41,115 | [1] 45,683 | 30,860 | | | | |
| Cobalt-nickel | 2 | 20,621 | 22,912 | 14,425 | | | | | 1 | 274,078 | 391,540 | 251,437 |
| Columb-tantalum | 1 | 3,184 | 3,538 | 1,312 | | | | | | | | |
| Copper | 15 | 315,945 | 631,892 | 154,995 | 2 | 86,893 | 173,789 | 74,118 | 2 | 87,311 | 174,621 | 46,216 |
| Corundum | 1 | 32,400 | 36,000 | 32,400 | | | | | | | | |
| Fluorspar | 4 | 59,859 | 119,718 | 38,258 | 1 | 2,713 | 5,425 | 2,713 | 1 | 61,357 | 122,715 | 40,293 |
| Graphite | 1 | 925 | 1,850 | 889 | | | | | | | | |
| Lead-zinc | 52 | 971,193 | 1,949,091 | 647,007 | 20 | [1] 468,972 | [1] 944,647 | 398,335 | 8 | 188,266 | 376,531 | 124,818 |
| Lead-zinc-cu | 8 | 323,582 | 647,164 | 305,388 | 4 | 71,125 | 142,250 | 65,892 | 2 | 34,500 | 69,000 | 32,527 |
| Manganese | 6 | 164,580 | 219,440 | 57,513 | 2 | 27,000 | 36,000 | 24,248 | | | | |
| Mercury | 3 | 172,277 | 229,703 | 95,271 | | | | | 2 | 242,512 | 323,349 | 165,460 |
| Mica | 69 | 322,907 | 358,785 | 240,293 | 14 | 96,011 | 106,679 | 86,229 | | | | |
| Monazite | 2 | 60,449 | 71,645 | 52,022 | 2 | 60,449 | 71,645 | 52,022 | | | | |
| Rutile | 1 | 15,675 | 20,900 | 15,209 | 1 | 15,675 | 20,900 | 15,209 | | | | |
| Sulfur | 1 | 39,705 | 79,410 | 23,706 | 1 | 39,705 | 79,410 | 23,706 | | | | |
| Talc | 1 | 29,267 | 32,519 | 11,662 | 1 | 29,267 | 32,519 | 11,662 | | | | |
| Thorium | 1 | 9,194 | 10,215 | 4,532 | | | | | | | | |
| Tin | 1 | 16,200 | 18,000 | 14,893 | | | | | | | | |
| Tungsten | 39 | 654,811 | 867,081 | 369,896 | 6 | 128,547 | 171,396 | 107,880 | 3 | 163,313 | 217,751 | 113,367 |
| Uranium | 19 | 432,534 | 480,593 | 354,699 | 5 | 156,561 | 173,957 | 150,959 | 5 | 101,275 | 112,528 | 92,694 |
| Total | 259 | 4,325,610 | 6,579,257 | 2,743,978 | 68 | 1,255,668 | 2,042,130 | 1,071,494 | 25 | 1,163,412 | 1,800,035 | 877,423 |

[1] 2 projects which are classified as "cancelations"—i. e. no Government funds were spent—have been certified. The footnote figures above do not include the combined contract value of $55,838 or Government participation of $45,759 on these 2 projects.

TABLE VI.—*Contract amendments distributed by commodity*

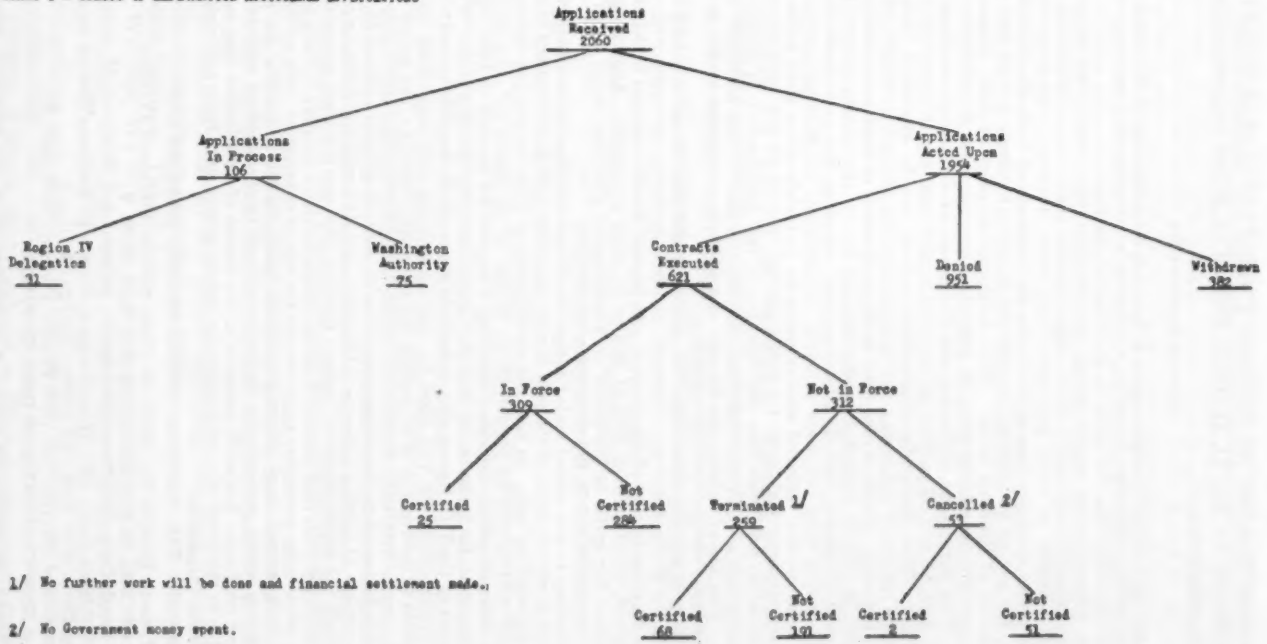
| Commodity | Amendment data month of January 1954 only | | | | | | Number of contracts executed through January 1954 | Number of contracts amended through January 1954 | Amendment data cumulative through January 1954 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total number of amendments | Number of dollar amendments [1] | Number of time amendments [2] | Number of technical amendments [3] | Net dollar changes by amendment | | | | Total number of amendments | Number of dollar amendments | Number of time amendments | Number of technical amendments | Net dollar changes by amendment | |
| | | | | | Government participation | Total value | | | | | | | Government participation | Total value |
| Antimony | 1 | | 1 | | | | 12 | 12 | 29 | 1 | 8 | 20 | $58,500 | $78,000 |
| Asbestos | 1 | | | 1 | | | 19 | 8 | 15 | | 6 | 9 | | |
| Beryl-mica | 2 | 1 | | 1 | $885 | $984 | 21 | 11 | 21 | 2 | 6 | 13 | 5,070 | 5,634 |
| Cobalt-nickel | | | | | | | 7 | 6 | 18 | 3 | 4 | 11 | 137,270 | 196,100 |
| Columbium-tantalum | | | | | | | 3 | 3 | 8 | | 4 | 4 | | |
| Copper | 6 | | 4 | 2 | | | 37 | 30 | 79 | 5 | 30 | 44 | 32,087 | 64,174 |
| Corundum | | | | | | | 1 | 1 | 2 | | 1 | 1 | | |
| Fluorspar | | | | | | | 9 | 5 | 9 | 1 | 4 | 4 | 30,375 | 60,750 |
| Graphite | | | | | | | 1 | 1 | 1 | | 1 | | | |
| Iron | | | | | | | 3 | 2 | 6 | | | 6 | | |
| Lead-zinc | 15 | | 13 | 2 | | | 155 | 130 | 451 | 39 | 153 | 259 | 479,365 | 951,727 |
| Lead-zinc-copper | 2 | | | 2 | | | 38 | 29 | 127 | 6 | 26 | 95 | 58,103 | 116,206 |
| Manganese | 2 | | 1 | 1 | | | 17 | 9 | 30 | 2 | 7 | 21 | 12,120 | 16,160 |
| Mercury | 1 | | 1 | | | | 20 | 14 | 30 | 1 | 17 | 12 | 37,125 | 49,500 |
| Mica | 7 | 1 | 5 | 1 | 1,575 | 1,750 | 119 | 54 | 108 | 13 | 71 | 24 | 24,553 | 27,281 |
| Monazite | | | | | | | 5 | 4 | 7 | 1 | | 6 | 16,295 | 19,633 |
| Platinum | | | | | | | 1 | | | | | | | |
| Rutile | | | | | | | 1 | 2 | 1 | 1 | | | −16,162 | −21,550 |
| Sulfur | | | | | | | 3 | 1 | 2 | | | 2 | | |
| Talc | | | | | | | 1 | 2 | 2 | | 2 | | | |
| Thorium | 1 | | 1 | | | | 4 | 3 | 6 | | 3 | 3 | | |
| Tin | | | | | | | 5 | 4 | 15 | 3 | 4 | 8 | 43,408 | 48,231 |
| Tungsten | 6 | | 2 | 4 | | | 85 | 54 | 156 | 17 | 42 | 97 | 173,863 | 232,056 |
| Uranium | 4 | | 2 | 2 | | | 54 | 34 | 105 | 3 | 36 | 66 | 18,114 | 20,127 |
| Total | 48 | 2 | 30 | 16 | 2,460 | 2,734 | 621 | 419 | 1,228 | 98 | 425 | 705 | 1,110,086 | 1,864,029 |

[1] "Dollar amendments" are those which change the estimated total cost of the projects and the Government's share thereof.

[2] "Time amendments" are those which change either the starting time provision or the total project time provision of the project.

[3] The category "Tech. (technical) amendments" includes all those which did not alter either the estimated total cost of the Government's share or the time provision of the contract. Technical amendments typically deal with engineering procedure to be followed, equipment to be used, and allowable expenditures for individual items.

CHART I - STATUS OF EXPLORATION ASSISTANCE APPLICATIONS




1/ No further work will be done and financial settlement made.

2/ No Government money spent.

Senator MALONE. At this point I would like to place in the record a statement by Mr. D. D. Blue, Bureau of Mines representative, on rutile subsitutes.

RUTILE SUBSTITUTES

I have been asked to again appear before this subcommittee to discuss probable and potential substitutes for rutile, a titanium-bearing mineral, and in particular to discuss substitutes for rutile in welding-rod coatings.

The United States import supply pattern for rutile was given in previous testimony and it will suffice at this time to state that a large percentage of the domestic supply of rutile has historically been obtained from Australia.

The major strategic uses of rutile are for welding-rod coatings, titanium carbides, for use as an alloying constituent in other strategic metals and in the production of titanium metal. Total rutile consumption in 1952, expressed as contained $TiO_2$ was 17,350 tons, 62 percent of this was used in welding-rod coatings. This percentage utilization was the lowest of statistical record and compares with 84 and 83 percent of the total supply used for this purpose in 1946 and 1947. This change in consumption pattern can be attributed to a large extent to the use of rutile as a raw material for the recently developed titanium metal industry. Rutile is also used in the production of fiber glass which shows promise of greatly expanded production and use in the coming years. It was previously developed that the titanium metal industry, if it is to grow at a rate commensurate with indicated potential consumption for strategic applications, must base its raw material requirements on materials other than rutile. The primary strategic claimants for rutile appear then to be the welding-rod producers, metal producers that use titanium in the manufacture of titanium-containing alloys, producers of titanium carbide, and possibly the producers of fiber glass. The use of substitutes for any one of these consumers would of course release rutile for use by other claimants.

In many of these applications, $TiO_2$ manufactured from ilmenite, which is plentiful in the North American Continent, can be substituted for rutile with a coincident increase in cost of the product. At present, rutile is priced at 5 to 6 cents per pound, manufactured $TiO_2$ at 22.5 to 26 cents per pound. Another possible substitute for rutile is low-grade or unsegregated titanium metal scrap as an alloy ingredient and in the production of carbides.

Returning to our stated major theme, rutile for welding-rod coatings, it is of interest to review some of the past history on consumption of titanium materials used for welding rods. In 1943 the consumption of $TiO_2$ for welding-rod coatings from all sources was 3.6 percent of the weight of the coated rod. In succeeding years this percentage increased, reaching a high of 5.4 percent in 1950, and was 5.1 percent in 1952, the latest year for which statistics are available. The distribution of the $TiO_2$ source also underwent a change during this period; in 1943 only 67 percent of the $TiO_2$ used for coating welding rods came from rutile, as compared to an average of 83 percent for the years 1946–52. The major part of the nonrutile $TiO_2$ used in 1943 was manufactured $TiO_2$, and this material has thus demonstrated its interchangeability with rutile to at least some extent. The large variety of welding rods available today contain numerous different coatings to satisfy the requirements of various welding jobs, and different manufacturers had developed rods that produce welding characteristics peculiar to their product. Thus, while some producers might accept the use of substitutes, such as manufactured $TiO_2$, titania slag, or other synthetic products for rutile, the use of such substitutes would undoubtedly result in changes in the welding characteristics of their products. A specific measure of the degree of substitution that might be possible in the event of a rutile shortage can be gained only from a survey of the producers themselves.

The major $TiO_2$ consuming welding electrode producers are:

The Lincoln Electric Co., 22801 St. Clair Avenue, Cleveland 17, Ohio
Arcrods Corp., 60 East 42d Street, New York 17, N. Y.
A. O. Smith Corp., 3533 North 27th Street, Milwaukee 1, Wis.
Harnischfeger Corp., 4400 West National Street, Milwaukee, Wis.
Hollup Corp., 4700 West 19th Street, Chicago 50, Ill.
Westinghouse Electric Corp., 306 Fourth Avenue, Pittsburgh, Pa.
Hobart Bros. Co., 1218 Hobart Road, Troy, Ohio

Although, as previously stated, a measurement of the minimum amount of rutile required per pound of welding rod produced is not available to the Bureau

of Mines, there are a number of materials available in North America, in addition to manufactured $TiO_2$, that have been used, that are being tested or that show promise as at least partial substitutes. These materials are:

1. Brookite: A mineral with the same chemical composition as rutile but with a different crystal structure. This material is not being mined to any great extent at the present time but can be obtained from deposits in Arkansas.

2. Reesite: A $TiO_2$ containing material produced by the Vanadium Corporation of America during World War II but not presently available. This material contains approximately 85 percent $TiO_2$.

3. Tanarc: A recently developed product of the Foote Mineral Co. and currently used as a partial substitute for rutile. This material contains approximately 70 percent $TiO_2$.

4. High-titania slag: A coproduct obtained by electric-furnace smelting of an ore containing iron oxide and ilmenite. Slags containing 70-plus percent $TiO_2$ are presently produced by this method.

By use of the rutile substitutes mentioned above, it is believed that domestic rutile requirements could be reduced to a small fraction of the present requirements and could, if necessary, be kept within the limits of North American production. The use of most of these substitutes would result in higher cost products. Some education or reeducation of the mechanics (welders) who are the ultimate consumers of welding rods would be required to acquaint them with the welding characteristics of electrodes with new types of coatings. It is doubtful that a shortage of usable welding rods would occur because of insufficient supplies of rutile.

## STATEMENTS OF ELMER H. WEAVER, ASSISTANT DIRECTOR (MATERIALS), OFFICE OF DEFENSE MOBILIZATION; DR. JOHN D. MORGAN, SPECIAL ASSISTANT; AND THOMAS CURTIS, CHIEF, FERROALLOYS DIVISION, OFFICE OF DEFENSE MOBILIZATION

Senator MALONE. Mr. Weaver, you have heard the testimony today. You have your assistant with you, Mr. Lawrence?

Mr. WEAVER. Mr. Lawrence is not here, to my knowledge.

Senator MALONE. You are Mr. Weaver?

Mr. WEAVER. I am Mr. Weaver, yes.

Senator MALONE. You just take charge. As you know, we are working with Mr. Fleming. He has been here several times. You have heard the testimony and know the objectives of the committee.

Does your Office of Defense Mobilization generally agree with what is being done in this regard, or are you contemplating any further action for incentives, to get into this columbium business?

Mr. WEAVER. As far as the columbium matter is concerned, I have with me here both Dr. Morgan, who is a mining engineer, and is my special assistant, and Mr. Curtis, who is the Chief of the Ferroalloys Division.

Both of these gentlemen have been very close to this program, and I would like to call upon Mr. Curtis first to give whatever information he can.

As you realize, most of the facts concerning the stockpile and the stockpile objectives are classified material.

Senator MALONE. That is true.

Mr. WEAVER. We will have to work around that the best we can.

Senator MALONE. That is true. What we would like to know is if you have any plans and are giving any thought to incentives to produce columbium and if you have anything you think will be helpful to the committee. Mr. Curtis, just proceed in your own way.

Mr. CURTIS. I think that perhaps a little background material might be useful, Senator.

ESTABLISHMENT OF AN EXPANSION PROGRAM ON COLUMBIUM

Generally, in developing an expansion program, the Government first establishes an expansion goal, which involves calculation of the industrial needs and the stockpile needs.

In the case of columbium the goal was worked out with the help of delegate agencies. There delegate agencies assist in preparing a balance sheet which shows how much would be necessary for the industrial needs as well as the requirements for the stockpile.

Senator MALONE. What is that agency?

Mr. CURTIS. Now, Dr. Morgan participated while the Defense Production Administration was still in existence. They were responsible for establishing these goals. Perhaps Dr. Morgan can speak of the establishment of the goal and the delegate agency in that matter.

Mr. MORGAN. For the record, I am Dr. John D. Morgan of the Office of Defense Mobilization. I will have to explain briefly what the organizational setup was about 3 years ago, at the time the Defense Production Act was passed, and the Executive orders, distributing the powers of that act among the various agencies of the Federal Government, were issued.

At that time, at the top level of the mobilization chain of command was the Office of Defense Mobilization.

At that time it was headed by Mr. Charles E. Wilson.

Senator MALONE. Charles Wilson, of General Electric?

Mr. MORGAN. Of the General Electric Co. Right, sir.

Next below ODM in level was the Defense Production Administration, initially headed by Gen. William H. Harrison, and then several successive administrators, and paralleling the Defense Production Administration, but taking orders from it on programs, was the Defense Materials Procurement Agency, headed nominally by Mr. Jess Larson, who was also the Administrator of the General Services Administration (GSA).

Senator MALONE. That ought to fix it so that no one could find the right man.

Mr. MORGAN. But the actual operator of the DMPA was Howard Young, as the Deputy Administrator.

The procedure DPA followed in establishing an expansion program was to obtain from the then Munitions Board of the Department of Defense the requirements for stockpiling purposes under Public Law 520 of the 79th Congress, as well as estimates of full mobilization military requirements and the requirements of the period of the Korean war; from the Atomic Energy Commission (AEC), estimates of what they needed; from the Commerce Department, in which was located the then National Production Authority.

Senator MALONE. Where was it located?

Mr. MORGAN. That was within the Commerce Department.

Senator MALONE. Was there any department of Government that did not get into this in some way or other?

Mr. MORGAN. It was difficult to find major agencies that were not in it, sir.

Senator MALONE. Who made the final decision?

Mr. MORGAN. Well, once DPA had all the requirements together——

Senator MALONE. Of course, that never happened?

Mr. MORGAN. No, sir. There were many final decisions. Once DPA had all those requirements together DPA would then go to the

Defense Materials Procurement Agency and say "Develop a program to meet these requirements, as expeditiously as possible, and within the limits of the authorities and funds that Congress has made available."

Senator MALONE. Who was this?

Mr. MORGAN. This was the Defense Materials Procurement Agency.

Senator MALONE. When was this?

Mr. MORGAN. This was in 1951 and 1952.

Senator MALONE. Who was at the head of the Defense Materials Procurement Agency then?

Mr. MORGAN. The Administrator of the Defense Materials Procurement Agency was Jess Larson and the Deputy Administrator was Howard Young.

Senator MALONE. He had the final responsibility? After 7 or 8 of these organizations had finally decided how much they needed, he had the responsibility of securing it?

Mr. MORGAN. He had the responsibility of securing it, within the terms of an approved expansion program.

Senator MALONE. Who approved the program?

Mr. MORGAN. The—at that time—Defense Production Administration approved the programs.

Senator MALONE. Under whom was that?

Mr. MORGAN. That was under Gen. William Harrison.

Senator MALONE. Under what department of the Government was it?

Mr. MORGAN. That was an independent agency created by Executive order and reporting to the Office of Defense Mobilization.

I am glad to report, sir, that since those organizational arrangements, there has been a considerable tightening up in the structure and many of the temporary agencies have been eliminated, and responsibility has been channeled into a smaller number of agencies. There are still several agencies, but a much smaller number.

Senator MALONE. Would you mind making, for the benefit of the committee, a list of all of them, in order of their importance and responsibility, and finally ending up as to where the final responsibility rests?

Mr. MORGAN. As they stand at the present time, sir?

Senator MALONE. Yes, sir. Maybe you could tell us.

Mr. MORGAN. I can give you a very brief list of their responsibilities.

(These lists described as tables 1 and 1a were subsequently furnished and by direction of the chairman are placed in the record at this point.)

TABLE I

AGENCIES OF THE FEDERAL GOVERNMENT THAT HAVE A SIGNIFICANT INTEREST IN STRATEGIC AND CRITICAL METALS AND MINERALS (SEPTEMBER 1952)

(Compiled by John D. Morgan, Jr., E. M., Ph. D.)

THE PRESIDENT—EXECUTIVE OFFICE OF THE PRESIDENT

The White House Office—Advises the President on legislation, organization, and other problems.

Office of the Special Assistant to the President—Advises on foreign development program.

*Office of Defense Mobilization (ODM)—Establishes general mobilization policies, including policies for the expansion of industry.

Bureau of the Budget (BB)—Reviews budget requests for defense production programs, stockpiling, and functions of the agencies concerned with metals and minerals. Secures coordinated views of the executive branch regarding legislation. Establishes necessary organizational patterns.

National Security Council (NSC)—Advises as to the imminence of war and reviews broad security programs, including stockpiling.

Central Intelligence Agency (CIA)—Provides information on foreign sources of metals and minerals.

National Security Resources Board (NSRB)—Advises the President concerning the coordination of mobilization, including reserves of strategic and critical materials.

Council of Economic Advisers (CEA)—Advises on broad economic policies.

*Defense Production Administration (DPA)—Directs and coordinates the defense production program including the exercise of the priorities and allocations powers, and the determination of production programs, goals, and the adequacy of facilities; also issues accelerated tax amortization certificates. Directs United States participation in the International Materials Conference.

*Defense Materials Procurement Agency (DMPA)—Purchases and makes commitments to purchase metals, minerals, and other materials for Government use or resale; encourages exploration, development, and mining of strategic and critical minerals and metals. Makes subsidy payments. Installs equipment in facilities. Functions in accordance with programs certified by Defense Production Administration.

General Services Administration (GSA)—Purchases materials for Government use or resale.

*Emergency Procurement Service (EPS)—Purchases, inspects, and stores strategic and critical materials for the national stockpile, and purchases other materials.

Department of the Interior—Responsible with the Munitions Board for stockpiling under Public Law 520, 79th Congress.

National Minerals Advisory Council—Advises on mineral policies.

*Defense Minerals Exploration Administration (DMEA)—Encourages exploration for metals and minerals within the United States.

United States Bureau of Mines (USBM)—Maintains industry statistics. Does extensive research and development in the field of mining and metallurgy. Administers mine safety laws.

United States Geologic Survey (USGS)—Does geologic work of all types.

*Defense Electric Power Administration (DEPA)—Assists in providing electric power.

Department of Defense:

Joint Chiefs of Staff (JCS)—Advises as to the accessibility in time of emergency to foreign sources of strategic and critical materials.

Munitions Board (MB)—Establishes stockpile programs under Public Law 520, 79th Congress. Also determines military requirements for strategic and critical materials.

Research and Development Board (RDB)—Reduces requirements for strategic materials in very short supply through conservation, substitution, or redesign.

Department of the Army—Aids in the determination of stockpile programs under Public Law 520, 79th Congress, and determines military requirements for strategic and critical materials.

Department of the Navy—As above.

Department of the Air Force—As above.

Department of Commerce:

Business Advisory Council—Advises on broad business policies.

*National Production Authority (NPA)—Allocates strategic and critical materials to meet the needs of defense programs and the national economy.

Bureau of the Census—Collects industry statistics including import-export data.

Office of International Trade (OIT)—Exercises export control powers.

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*Indicates temporary agencies implementing the Defense Production Act of 1950. Indentation indicates subordinate agencies within a major agency.

Maritime Administration:
*National Shipping Authority (NSA)—Provides shipping for strategic and critical materials.
Coast and Geodetic Survey (CGS)—Conducts geophysical surveys and tidewater explorations.
Industry Evaluation Board—Selects industrial facilities, and their supporting economic resources including installations and materials which are key to the defense effort.
Facilities Protection Board—Develops programs for physical protection and maintenance of the security of economic resources selected by the Industry Evaluation Board.
Reconstruction Finance Corporation (RFC)—Purchases and resells tin, operates the Government tin smelter, and makes loans to stimulate industrial production, including mining.
Department of State—Advises concerning metals and minerals development programs in foreign countries. Assists in establishing United States stockpile programs.
Mutual Security Agency (MSA)—Develops resources of friendly countries in the interest of their security and independence, and the national interest of the United States, and to facilitate participation in the U. N. system for collective security. Promotes increased production of materials in which the United States is deficient.
Export-Import Bank of Washington (Ex-Imbank)—Provides necessary financing to facilitate mineral development programs in foreign countries.
Tariff Commission—Evaluates the effects of tariffs on the mineral industry.
*Economic Stabilization Agency (ESA)—Establishes general price and wage stabilization policies.
*Office of Price Stabilization (OPS)—Establishes price ceilings for metals and minerals.
Department of Labor:
*Defense Manpower Administration—Assists in obtaining the necessary labor force.
Treasury Department—Establishes and implements tax programs affecting mineral properties.
Department of Justice—Enforces antitrust laws involving segments of the mineral industry.
Department of Agriculture—Assists in establishing United States stockpile programs.
Commodity Credit Corporation (CCC)—Exchange when possible surplus agricultural commodities for strategic and critical metals and minerals.
*Defense Transport Administration—Assists in providing transportation for metals and minerals.
Atomic Energy Commission (AEC)—Controls and procures fissionable and source materials.
National Academy of Sciences:
Minerals and Metals Advisory Board (MMAB)—Advises on technical problems in the minerals and metallurgical field.
National Advisory Committee for Aeronautics (NACA)—Tests materials, fuels, and lubricants.
National Science Foundation (NSF)—Encourages scientific activities which support security programs.
Renegotiation Board—Issues raw materials exemption list which exempts certain metals and minerals from contract renegotiation.
*Small Defense Plants Administration (SDPA)—Assists small business.
General Accounting Office (GAO)—Reviews and audits all Government contracts.

MAJOR UNITED STATES GOVERNMENT COMMITTEES CONCERNED WITH METALS AND MINERALS

ODM Committee on Production Policy (PPC)—representatives of Defense, Interior, Commerce, Agriculture, Labor, DPA, DMPA, AEC, DTA, ESA, NSRB, and other interested agencies as required—advises Defense Mobilizer on defense production problems such as development and operation of the mobilization production base; improving the coordination and effectiveness of Federal policies and programs; and proposed legislation, orders and regulations relating to production.

DPA Defense Materials Policy Committee (DMPC)—representatives of ODM, DPA, NPA, DMPA, ESA, GSA, MSA, OPS, RFC, NSRB, State, Interior, Munitions Board, Agriculture, Budget Bureau—reviews broad policy problems affecting the supply of materials.

DPA Defense Materials Operating Committee (DMOC)—representatives of ODM, DPA, NPA, DMPA, ESA, GSA, MSA, OPS, RFC, NSRB, State, Interior, Munitions Board, Agriculture, Budget Bureau—reviews supply-requirements data for strategic and critical materials and recommends appropriate actions to increase supplies and to channel them to essential programs.

DPA Requirements Committee—representatives of claimant agencies with priority and allocation authority (Department of Defense, AEC, GSA, VA, Agriculture, Interior, ICC, Commerce, State, DMPA)—reviews quarterly allocations of controlled materials and establishes the broad framework of the defense production program through allocation of controlled materials.

Munitions Board Interdepartmental Stockpile Committee (ISC)—representatives of State, DMPA, GSA, Interior, Commerce, Agriculture, MSA, DPA, Munitions Board, NSRB, AEC, RDB, Budget Bureau, Army, Navy, and Air Force—advises the Munitions Board on the quantity and quality of materials to be stockpiled as well as on general stockpile policy.

Senate committees:
- Appropriations
- Armed Service:
  - Stockpile Subcommittee
  - Preparedness Subcommittee
- Interior and Insular Affairs

House committees:
- Appropriations
- Armed Services: Stockpile Subcommittee
- Interior and Insular Affairs: Subcommittee on Mines and Mining
- Judiciary: Subcommittee on the Study of Monopoly Power

Joint committees:
- Joint Committee on Defense Production
- Joint Committee on Atomic Energy

### Major International Groups Concerned With Metals and Minerals

International Materials Conference (IMC): The purpose of these committees is to consider and recommend to governments the specific action which should be taken, in the case of each commodity, in order to expand production, increase availability, conserve supplies, and assure the most effective distribution and utilization of supplies among consuming countries.
- Central Group (IMC): Representatives of United States, Australia, Brazil, Canada, France, India, Italy, United Kingdom, Organization of American States, and Organization for European Economic Cooperation.
- Copper-Zinc-Lead Committee (IMC): Representatives of United States, Australia, Belgium, Canada, Chile, France, Germany, Italy, Mexico, Norway, Peru, United Kingdom.
- Manganese-Nickel-Cobalt Committee (IMC): Representatives of United States, Belgium, Brazil, Canada, Cuba, France, Germany, India, Norway, South Africa, and United Kingdom.
- Sulphur Committee (IMC): Representatives of United States, Australia, Belgium, Brazil, Canada, France, Germany, India, Italy, Mexico, New Zealand, Norway, Switzerland, Sweden, South Africa, and United Kingdom.
- Tungsten-Molybdenum Committee (IMC): Representatives of United States, Australia, Bolivia, Brazil, Canada, Chile, France, Germany, Japan, Portugal, Spain, Sweden, and United Kingdom.

North Atlantic Treaty Organization (NATO): Development of combined plans including those affecting metals and minerals to implement the North Atlantic Treaty.

Organization of American States (OAS)

Organization for European Economic Cooperation (OEEC)

International Tin Study Group

TABLE IA

CHANGES IN TABLE 1 THAT HAVE BEEN MADE IN THE PERIOD SEPTEMBER 1952 TO MARCH 1954

The National Security Resources Board (NSRB) and the Defense Production Administration (DPA) have been abolished and their functions transferred to the Office of Defense Mobilization (ODM). In addition, the stockpile responsibilities of the Munitions Board and the Secretaries of the Army, Navy, and Air Force have been transferred to the Office of Defense Mobilization, as well as certain stockpile responsibilities of the Secretary of the Interior.

The Defense Materials Procurement Agency (DMPA) has been abolished and its functions transferred to the Emergency Procurement Service (EPS) of the General Services Administration (GSA).

In the Department of the Interior some of the stockpile responsibilities have been transferred to ODM and the Defense Electric Power Administration (DEPA) has been abolished.

In the Department of Defense the Munitions Board has been abolished and its functions transferred to the Assistant Secretary of Defense for Supply and Logistics, and the Research and Development Board (RDB) has been abolished and its function transferred to the Assistant Secretary of Defense for Research and Development.

In the Department of Commerce the National Production Authority (NPA) has been abolished and its functions transferred to the Business and Defense Services Administration (BDSA). The Facilities Protection Board has been abolished.

The Reconstruction Finance Corporation RFC is being liquidated and its loan functions transferred to the Department of the Treasury.

The Mutual Security Agency (MSA) has been abolished and its functions transferred to the Foreign Operations Administration (FOA).

The Economic Stabilization Agency (ESA) and the Office of Price Stabilization (OPS) have been abolished.

In the Department of Labor the Defense Manpower Administration has been abolished.

The Small Defense Plants Administration (SDPA) has been abolished and its functions transferred to the Small Business Administration (SBA).

The ODM Committee on Production Policy, the DPA Defense Materials Policy Committee, the Defense Materials Operating Committee and the Munitions Board Interdepartmental Stockpile Committee have been abolished and their functions transferred to the Office of Defense Mobilization's Interdepartmental Materials Advisory Committee (IMAC). The DPA Requirements Committe has been abolished.

The International Materials Conference (IMC) and its various commodity committees have been abolished.

At the present time the Office of Defense Mobilization, headed by Dr. Arthur S. Flemming, is responsible for the establishment of stockpile objectives under Reorganization Plan No. 3. They are responsible for the establishment of objectives for the broad mobilization planning of the Government, and for the issuing of accelerated tax amortization certificates.

Senator MALONE. Tax amortization certificates. What is that?

Mr. MORGAN. Those are certificates authorizing accelerated tax amortization under section 124 (a) of the Internal Revenue Act of 1950 (Public Law 814, 81st Cong.).

Senator MALONE. What are the objectives that you obtain by using that particular section?

Mr. MORGAN. Well, sir, the act is being used across the board from raw materials to manufactured products including items like freight cars or harbor facilities, in any case where there is a defense shortage, to facilitate industrial investment to meet the shortage.

Senator MALONE. When was that bill passed by Congress?

Mr. MORGAN. I believe the amendment to the Internal Revenue Act was in 1950.

Senator MALONE. That was passed about the time that the Korean war came along?

Mr. MORGAN. It was shortly after the start of the Korean war, and the act was approved on September 23, 1950.

Senator MALONE. That includes it?

Mr. MORGAN. Yes, sir.

Senator MALONE. Let me give you my idea. It may or may not be right.

I was over there on the Senate floor then and it was put in this bill primarily to write off investments that were made for national defense purposes, for which there would be no foreseeable market, or at least not a sufficient market after the national defense had been satisfied.

Now, I understand it is just a general workhorse, like a racehorse, after he cannot run much they just give him all the work.

When did this general spread happen?

Mr. MORGAN. To the best of my knowledge, Senator, that is not the case, although I can only speak for what is going on in the case of the raw materials.

Senator MALONE. You mean what is not the case? They are using it in general, all over the map, are they not?

Mr. MORGAN. No, sir. In the case of the manufactured articles—and here, I am not an authority, I wish to make clear—I understand that no tax amortization certificates are normally granted unless there is an established expansion goal, and an expansion goal must be related to a defense shortage, either in the period of the Korean war or in the event of full mobilization.

So, normally at least, the rules are that unless there is a present or foreseeable defense shortage, that cannot otherwise be met, tax amortization cannot be given.

Senator MALONE. Could you submit a list—and that is going to be quite a list—of projects where you have utilized the short amortization period in the financing? Could you give us a list as to 1950?

Mr. MORGAN. A list of just materials, or all cases?

Senator MALONE. The list of projects on which the short amortization period has been utilized?

Mr. MORGAN. There are such printed lists available, sir. I will get a copy and see that you get one.

Senator MALONE. You may submit it to the committee in the morning.

Mr. MORGAN. I fear we will not be able to have it by tomorrow morning. We could get it up to you on Monday morning.

Senator MALONE. Well, you mean that there is no Government outfit on the job tomorrow? We will all be here.

Mr. MORGAN. Some will be there, sir, but to get a report as to what was done in 1950 would be a considerable job.

Senator MALONE. Are there lists available, already made up?

Mr. MORGAN. They have been printed in the past, sir, but that was done when the Defense Production Administration was responsible. That agency has been abolished and we will have to find the lists in its files.

Senator MALONE. Who inherited the onus of that argument?

Mr. MORGAN. The Office of Defense Mobilization, of which we are a part.

Senator MALONE. You inherited that?

Mr. MORGAN. Yes, sir.

Senator MALONE. Will you get it at your earliest convenience from the beginning to the present time?

Mr. MORGAN. We will get it as quickly as possible.

Senator MALONE. Are there any reports as to the status of projects; that is to say, the ones that have been completed, and the present projects?

Mr. MORGAN. There may be such reports and, in addition, we can give you a list of all the expansion goals which have been met, that are 100 percent complete.

(Material submitted to Mr. Alderman, Tuesday, March 2, 1954 and retained in the committee files.)

Senator MALONE. I have to go, and I will leave Mr. Adlerman in charge. We really want that list from you and we want your cooperation or at least your comments on what you would do in cooperating with this program.

I appreciate your coming here and I will probably not be back before you have gone.

Mr. ADLERMAN. We will try to bring this to a close as fast as we can, now.

Mr. Weaver, I think the principal reason that we asked the ODM to come in today was that we wanted to have you present when all of this conversation was taking place.

I just wanted to make one comment. We have one more witness, Mr. Scott, and I would like to have Mr. Blue and Mr. Kline present. I would like to have Mr. Knickerbocker remain, if possible. We called you here principally to have you present when this testimony took place, so you could see what the situation is, and of course, you are the overriding agency. In a way I suppose you act as a sort of boss in telling the other agencies exactly what to do.

For example, you give out the allocations to GSA as to what they can do by way of performance.

The Senator's idea was to have you present so that you can coordinate and do everything possible to get the program rolling.

Mr. WEAVER. It has been very, very interesting, and I am sure that we have received a great deal of benefit out of it.

Mr. ADLERMAN. And I am sure that Dr. Flemming will cooperate in every way with these other agencies, in which we can get some coordinated effort in getting the production of columbium and the other minerals. I think that that was about all, unless you have something to add.

Mr. WEAVER. I might add that the decisions we make, of course, are in consultation with the various interested agencies; although the responsibility of the decision is ours, it is done after consultation.

Mr. ADLERMAN. We found, and I do not say that there is any particular agency that said so, that some of the agencies have used the excuse that their hands are tied sometimes by ODM or by some other proposition.

Mr. WEAVER. That may sometimes be an easy way out.

Mr. ADLERMAN. That may be, but, at the same time there does seem to be sometimes a sort of hiatus between the different groups as to what they are trying to accomplish, and they may bump into one

particular person in another agency who does not want to get into the program.

That is why we called you to see whether or not you can coordinate the work of these agencies, not only in columbium, but in titanium as well.

Mr. WEAVER. It has been invaluable to us.

Mr. ADLERMAN. I hope that you feel that way.

The next witness will be Mr. Scott.

## STATEMENT OF C. H. SCOTT, DENVER, COLO., PRESIDENT OF THE MAGNET COVE TITANIUM CORP., LITTLE ROCK, ARK.

Mr. ADLERMAN. Mr. Scott, will you identify yourself for the record?

Mr. SCOTT. My name is C. H. Scott, Denver, Colo., president of the Magnet Cove Titanium Corp.

I would like very much if I could indulge on these gentlemen of Defense Minerals, to listen in on this little story, if you don't mind doing that.

This is addressed to Senator Malone as chairman of the Minerals, Materials, and Fuels Economic Subcommittee.

I first want to compliment you for the orderly and effective manner in which you developed the recent hearing on the importance of one of our most strategic, precious minerals, titanium, that is so essential in the building of jet engines and airplane frames.

It has been my pleasure to tell several Senators and Congressmen, as well as the chairman of the Military Affairs Committee, about the fine job that you did in developing the weakness that exists in the production and in the manufacture of titanium minerals and metals.

I am confident that your committee will develop just as effective a hearing in pointing out the lag that exists in the production of columbium, tantalum, cobalt, rutile, and manganese, that are recognized as must minerals and metals in the manufacture of jet engines and airplane frames.

You have not, in the past, and likely will not, in the future, render a greater service to your country than you have in the development of the actual facts that stresses the shortage of these strategic materials to the extent of being shocking and creating a degree of fear in the minds and hearts of each Member of Congress who knows and understands the shortage of these critical minerals, as well as citizens who understand these facts.

As president of the Magnet Cove Titanium Corp. of Little Rock, Ark., I am naturally selfish to a degree in making the statement before the committee. But, on the other hand, I do feel that if I am able to offer a few facts and suggestions that would be helpful in developing a more sustaining and continuous bold program by the Government, that would give us a greater degree of production of these most strategic and precious minerals—titanium, columbium, cobalt, tantalum, and manganese—that are recognized as musts in the construction and building of our jet engines and airplane frames, that I will have contributed an unselfish service for the good of our Nation to the same degree that some of the other witnesses have so ably done.

At this particular point, Mr. Chairman, I want to make an observation on some of the statements of the gentlemen who represented the jet engines, this afternoon.

We had no representatives from the aircraft industry in making the planes. They were the engine manufacturers.

Mr. ADLERMAN. You mean the airframe people?

Mr. SCOTT. The airframe people.

With your indulgence and with your permission, I want to file these letters in the record, pointing out the value of columbium, along with titanium, in the construction of the aircraft frames.

This is from Curtiss-Wright Corp., Wright Aeronautical division:

We feel that columbium stabilized welding rod is preferable but not mandatory. Extra low-carbon stainless steel is a good substitute for 347, but some steel mills have trouble making it. Type 347 is preferable to 321 because it has greater cleanliness and better quality and not for any reasons----------

CURTISS-WRIGHT CORP.,
WRIGHT AERONAUTICAL DIVISION,
*Wood-Ridge, N. J., September 22, 1953.*

Mr. C. H. SCOTT,
*C. H. Scott & Associates, Denver, Colo.*

DEAR MR. SCOTT: Your letter of September 7, addressed to Mr. Lundquist has been referred to the writer for reply.

The information given you by others on columbium versus titanium stabilization is essentially correct and we offer the additional comments.

With reference to the statement, "there will be a demand for all of the columbium that can be produced," this was true in the days when conservation measures were first imposed and there was a lively demand for columbium. Since then, some substitutions have been successful and the industry has learned how to be saving. If the market were to become saturated, who can say that there will be a demand for all that can be produced?

We feel that columbium stabilized welding rod is preferable but not mandatory. Extra low carbon stainless steel is a good substitute for 347 but some steel mills have trouble making it. Type 347 is preferable to 321 because it has greater cleanliness and better quality and not for any reasons connected with the titanium vaporizing in the fusion zone during welding.

If there were an ample supply of columbium, we would use 347 because of its better quality in the sheet form. We would also use it for 18–8 castings because no one has ever been successful with titanium stabilized castings. Extra low carbon castings would be satisfactory but it is hard to get low carbon scrap for melting.

We hope this information will be useful to you.

Very truly yours,

M. H. YOUNG,
*Engineering Director, Production Services.*

Mr. SCOTT. This is from Beech Aircraft Corp., September 24, 1953, addressed to C. H. Scott, Denver, Colo.

The shortage of columbium about 3 years ago led to a mandate from the Government conserving its use for jet engine and gas turbine applications. Some of the high temperature or super alloys used in the gas turbine applications contain as much as 4 percent of columbium. The advantages of using columbium in these applications have been well established, but more authoritative information could be obtained from the jet engine manufacturers, such as General Electric Co., Westinghouse, or Curtiss Wright, as we have not been directly involved with the production or use of jet engines.

that is signed by the metallurgical and process engineer.

Mr. ADLERMAN. That will be exhibit No. 2, Mr. Scott.

(The letter referred to is as follows:)

BEECH AIRCRAFT CORP.,
*Wichita, Kans., September 24, 1953.*

C. H. SCOTT & ASSOCIATES,
*Denver, Colo.*
(Attention: Mr. C. H. Scott.)

DEAR SIRS: Your letter addressed to Mr. T. A. Wells, vice president and chief engineer has been referred to the writer for reply. Mr. Wells is no longer with Beech Aircraft Corp.

In answer to your inquiry, to the present time, our use of columbium containing alloys has been confined to type 347 stainless steel and the attendant welding rods or electrodes. Over the period of years titanium stabilized stainless steel type 321 and columbium stabilized type 347 have been completely interchangeable for all of our applications except welding rods or electrodes which must be of the columbium bearing type. Somewhat in disagreement with your quotations from other companies we do prefer the type 321 stainless steel for nearly all of our applications. We have experienced less difficulty with type 321 particularly in forming applications.

The shortage of columbium about 3 years ago led to a mandate from the Government conserving its use for jet engine and gas turbine applications. Some of the high temperature or super alloys used in the gas turbine applications contain as much as 4 percent of columbium. The advantages of using columbium in these applications have been well established but more authoritative information could be obtained from the jet engine manufacturers such as General Electric Co., Westinghouse, or Curtiss Wright, as we have not been directly involved with the production or use of jet engines.

We hope the above will satisfactorily answer your inquiry.

Yours very truly,

A. H. LIPPITT,
*Metallurgical and Process Engineer.*

Mr. SCOTT. This is from Bendix Aviation Corp., dated October 30, 1953, addressed to C. H. Scott, Denver, Colo.

* * * Titanium is added so that its concentration is 5 times that of the carbon, while columbium is added to the extent of 10 times the carbon concentration. In service which does not require welding, the difference between the two compositions is not significant. The titanium stabilized suffers during welding from oxidation of the titanium; therefore, in such an application, columbium stabilized is preferred.

Exploitation of this property is dependent primarily upon the economics of rutile and titanium dioxide production. Since rutile is abundant in this country and abroad, probably the economic cutoff is at a fairly high rutile concentration. The rutile production should carry the costs, while the columbium could be the gravy.

To mine this property successfully, it would be necessary to core drill to determine the extent of the ore body and the rutile content within the ore body. A method of producing a concentrate from the ore would have to be developed. If these factors are promising, exploitation could take place profitably. There is a ready market for rutile in the pigment and welding industries.

The recovery of the columbium would be a fairly simple step during the refining operation. Te remove the titanium from the ore, the ore is treated with chlorine in the presence of carbonaceous material at about 900° centigrade. The rutile reacts to form titanium tetrachloride and in the case of columbium, the pentachloride.

These compounds are volatile at this temperature, so they could be passed into a distillation column. * * *

This is from Mr. R. I. Adams, the staff engineer.

Mr. ADLERMAN. That may be exhibit No. 3.

(The letter referred to is as follows:)

BENDIX AVIATION CORP.,
*Detroit, Mich., October 30, 1953.*

Mr. C. H. SCOTT,
*C. H. & Associates, Denver, Colo.*

DEAR MR. SCOTT: Mr. Hyland has requested me to answer for him your letter of September 5, 1953, concerning titanium and columbium ore properties.

Bendix Aviation Corp. is not in a position to endorse a project of this nature in any way, and our company name should not be used in any connection with the promotion of this development.

However, as you requested, we have asked our senior metallurgist for his comments on the advantages of columbium and titanium. His comments are as follows:

"It appears that Mr. Scott desires an opinion on the relative merits of columbium and titanium stabilized stainless steel. It is a widely known fact that

stainless steel which is required to operate above about 800° F. suffers from intergranular corrosion unless stabilized. The function of the stabilizing elements is to form carbides which are more stable than chromium carbide (the presence of chromium carbide indicates a reduction in corrosion resistance).

Titanium is added so that its concentration is 5 times that of the carbon while columbium is added to the extent of 10 times the carbon concentration. In service which does not require welding, the difference between the two compositions is not significant. The titanium stabilized suffers during welding from oxidation of the titanium; therefore, in such an application columbium stablized is preferred.

Exploitation of this property is dependent primarily upon the economics of rutile (titanium dioxide) production. Since rutile is abundant in this country and abroad, probably the economic cutoff is at a fairly high rutile concentration. The rutile production should carry the costs while the columbium could be the gravy.

To mine this property successfully, it would be necessary to core drill to determine the extent of the ore body and the rutile content within the ore body. A method of producing a concentrate from the ore would have to be developed. If these factors are promising, exploitation could take place profitably. There is a ready market for rutile in the pigment and welding industries.

The recovery of the columbium would be a fairly simple step during the refining operation. To remove the titanium from the ore, the ore is treated with chlorine in the presence of carbonaceous material at about 900° C. The rutile reacts to form titanium tetrachloride and in the case of columbium, the pentachloride.

These compounds are volatile at this temperature so they could be passed into a distillation column. The separation would be quite simple since titanium tetrachloride has a boiling point of 136.4° C. while columbium pentachloride boils at 240.5° C. After the separation, the titanium tetrachloride would be processed by one of several methods depending upon the desired product. The columbium pentachloride could be processed to give elemental columbium."

We appreciate your interest in Bendix Aviation Corp. and we wish you every success in developing your project.

Very truly yours,

R. L. ADAMS, *Staff Engineer.*

Mr. SCOTT. I have just one more other comment. This is a letter from Lockheed Aircraft Corp., dated September 18, 1953:

Columbium is an essential element of several alloys specifically created for high temperature service, that is, Inconnel X, Multimet, etc., and used to a large degree by engine manufacturers.

Due to the ease with which titanium oxidizes at elevated temperatures, columbium is required as a stabilizing element in stainless steel welding rod and in stabilized stainless steel castings.

While both columbium and titanium stabilized stainless steels are weldable, and we use them interchangeably, many metallurgists feel that as the titanium may oxidize out of the weld area, that the columbium stabilized stainless steel products can be welded "hotter" and faster, without impairing corrosion resistance.

Many metallurgists believe that the use of columbium in stabilized stainless steel yields a cleaner product, that is, a product with fewer nonmetallic or metalloid particles than titanium, and therefore a slightly higher strength product, which they prefer. Despite this, however, we consider the advantage is so small that Lockheed uses the columbium and titanium stabilized grades of stainless interchangeably.

Mr. ADLERMAN. That may be inserted as exhibit No. 4.

(The letter referred to follows:)

LOCKHEED AIRCRAFT CORP.,
*Burbank, Calif., September 18, 1953.*

Mr. C. H. SCOTT,
C. H. SCOTT & ASSOCIATES,
*Denver, Colo.*

DEAR MR. SCOTT: In reply to your letters of August 15, and September 7, 1953, requesting information on the relative value of columbium and titanium in airplane production, we have outlined below several major factors which indicate why both metals are extremely important.

1. Columbium is an essential element of several alloys specifically created for high temperature service, i. e. Inconel X, Multimet, etc., and used to a large degree by engine manufacturers.

2. Due to the ease with which titanium oxides at elevated temperatures, columbium is required as a stabilizing element in stainless steel welding rod and in stabilized stainless steel casings.

3. While both columbium and titanium stabilized stainless steels are weldable and we use them interchangeably, many metallurgists feel that as the titanium may oxidize out of the weld area that the columbium stabilized stainless steel products can be welded "hotter" and faster without impairing corrosion resistance.

4. Many metallurgists believe that the use of columbium in stabilized stainless steel yields a cleaner product, that is a product with fewer nonmetallic or metalloid particles than titanium and therefore a slightly higher strength product, which they prefer. Despite this, however, we consider the advantage is so small that Lockheed uses the columbium and titanium stabilized grades of stainless interchangeably.

In view of the above, it is evident that despite the recent emphasis on titanium stabilized steel products (due to the shortage of columbium), titanium cannot supplant columbium entirely and that both metals are of prime importance in modern production.

It should be emphasized that Lockheed will continue to use columbium and titanium stabilized stainless steel products interchangeably, depending upon availability and market conditions, except for such applications where columbium stabilized materials are required, such as welding rod and castings.

It is our opinion therefore that any attempts to increase the available supply of columbium and titanium would meet with enthusiastic encouragement by many agencies and companies.

Very truly yours,

LOCKHEED AIRCRAFT CORP.
CALIFORNIA DIVISION,
J. B. WASSALL,
*Assistant Chief Engineer.*

Mr. SCOTT. The reason, Mr. Chairman, that I wanted to insert these letters at this time was to stress the importance of the columbium in the construction of aircraft frames. I would like now to continue with my statement.

May I raise a red flag of danger by quoting several outstanding authorities on this very sensitive and all-important question of the Government doing everything possible in joining hands with corporations, research institutes, and foundations in finding deposits of the strategic and precious metals and in doing metallurgical research, hoping to develop a process that will separate these minerals that they might be used as an alloy with stainless steel in the building of our jet engines and airplane frames.

I am going to read one paragraph of Mr. Hurley, chairman of the Curtiss-Wright Corp., who appeared before your committee:

Titanium is a must, and we have already approached the position of being too late. Any step we can take to get it we must take. I'm not talking about something we are designing, but about the airplanes that are wanted in 1955. We would like to have 3,500 tons in 1956 ourselves, and 5,800 tons in 1957. In an emergency at that time we would like to have 36,000 tons ourselves. Our licensees should have at least another 36,000 tons.

That is part of his statement.

Statements by other officers of manufacturing companies of jet engines and airplanes, as well as some of the men in our armed services, expressed the same degree of anxiety about our present deficiency in the production of titanium metal—produced approximately 2,600 tons last year.

The following statement by Mr. Carl Rolle, Office of Secretary of Defense, who wound up the titanium hearing, that the aircraft manufacturers had failed to advise his Office of their needs for anything like what they testified indicates, and the statement by Air Force Secretary Harold Talbott to the extent that "The problem has not come to my attention and I am ashamed that I have not gotten into it earlier" are shocking and unfortunate.

These statements by these two high officials indicate that something drastic must be done to spotlight and publicize the weakness that now exists in the production of titanium metal that is simply a must in meeting the requirements of jet engine manufacturers and the aircraft industry.

Our Government acted wisely approximately 8 years ago when it created the Atomic Energy Commission to act as an independent agency, without any restraint, without redtape, and with ample money to undertake a task of finding ways and means to make atomic and hydrogen bombs.

The Government has spent and appropriated approximately $14 billion up to this date. The Atomic Energy Commission has expended approximately $11,500,000,000 in carrying out and executing this tremendous undertaking.

The Commissioners of the Atomic Energy have kept their number of employees to a minimum, but have been aggressive and alert and smart in making contracts with corporations, institutes, and foundations, as well as universities, to assist in developing this tremendous project. This ambitious program has had the benefit of thousands of the finest minds and brains of scientists, metallurgists, physicists, chemists, mechanical and electrical engineers, and other engineers, the total number of professional, business, and employees of corporations, research foundations and institutes and universities, and employees of contractors, number approximately 150,000 who are directly working for and with the Atomic Energy Commission, as contractors.

This great accomplishment by the Atomic Energy Commission would have been impossible, in fact would have been bogged down, if it had been proposed by the Congress that several governmental agencies would have been responsible in executing the law.

I do not think so many Government agencies should be involved and be responsible, as have been in the development and production and the responsibility of stockpiling the many strategic minerals and metals so essential in the manufacturing of military equipment.

May I call your attention to the fact that the Secretary of the Interior, that the Bureau of Mines, that the United States Geological Survey, DMEA, DMPA, GSA, EPA, ECA, and others, have been responsible in the execution and development of this most sensitive and all-important program of finding and furnishing the many strategic minerals and metals.

Without implying any criticism of any individual agency or personality that has been a part of this program during the past 4 years, I must say that with so many agencies involved that it slows down any kind of a program of this character. Too many restraints, too much redtape, too much conservatism, fear of making a mistake, and the lack of authority, in many cases, has caused delay and frustration.

SUGGESTS COMMISSION

Personally, I would like to see the committee recommend that the President of the United States have the power of appointing three Commissioners to be approved by the Senate to serve on the Commission, or a Director appointed by the Secretary of Defense and that either the Commission or the Director be given enough authority and enough money to expedite this very essential program. Congress should appropriate ample money whereby contracts and agreements could be made with corporations, research foundations, and institutes and universities, to do metallurgical and scientific research on any and all of these strategic minerals.

It would be rather ironic and an indictment against a responsible government to permit Russia or any other potential enemy to outstrip us in the manufacturing of jet engines and jet bombers. It would simply place such nation or nations in an enviable position of carrying their atomic bombs and hydrogen bombs to strategic points in the United States quicker than we could retaliate on strategic points in Russia or its satellite nations.

We cannot discount the possibility of Russia in the expenditure of ample money and by benefiting through and by the knowledge of their great scientists and metallurgists, in finding, processing, producing, and manufacturing every known mineral and metal that are essential in the construction of jet bombers.

I will hazard the statement that they are carrying on a more continuous and sustaining program than we are, in the search of these strategic minerals, and in trying to develop processes that will refine titanium ore into titanium metal. We simply cannot be too late.

May I quote from three current articles by outstanding personalities stressing the ability of Russia in keeping abreast with us in development of a strong air force?

No. 1. Aviation Week, February 15, 1954, by David A. Anderson, underscores airpower behind the Iron Curtain. The article states that Russia has two new jet bombers capable of doing 480 miles per hour, service ceiling in the neighborhood of 50,000 and range which approximates 3,000 miles, without aerial refueling. He states that more than 400 of these aircraft are supposed to be based in the northern provinces of U. S. S. R. across the Polar icecap from the North American continent.

It is possible for Russia, if, through her know-how of metallurgical research, and with some luck in finding an ample supply of columbium, cobalt, tantalum, nickel, and can produce enough titanium metal, would make it possible to construct jet bombers that would travel 750 to 1,000 or even 1,500 miles per hour.

No. 2. How to Get Atomic Power Faster, by William Hard.

Mr. Adlerman, that is in this current issue of Reader's Digest:

**The Soviets may have within their power the capacity not only to match our own atomic efforts, but even, possibly to outstrip us.**

**And why not? Let us discard our American arrogance which assumes that the Russians know nothing about the atom except through spies. Let us reflect upon some facts mentioned in a current book, Report of the Atom, by Gordon Dean, who till recently was Chairman of the Atomic Energy Commission. Here are those facts:**

**The first fundamental table of nature's elements, displayed according to the weights of their atoms, was developed in 1869 by the Russian Mendeleev.**

A marked advance in knowledge of the nucleus of the atom was made in 1927 through the cosmic-ray studies of the Russian Skobelzin.

Europe's first cyclotron, for smashing atoms, was built in 1937 at the Radium Institute of Moscow.

The spontaneous splitting of the uranium atom, from which all atomic power is primarily derived, was discovered in 1939 by the Russians Flerov and Petrazhak.

In 1930 the Russians had 150 institutions of higher learning for producing professional specialists. In 1952 they had 900. In 1930 there were 200,000 students in these schools. In 1952 there were 1,400,000.

The Russian production of engineers is equal to our own, and perhaps greater. The Russian production of topflight scientists, at the level of the degree of doctor of philosophy, is abreast of ours.

This is No. 3. This appeared in this month's Newsweek, March 1:

Let's Not Kid Ourselves About Russian Science—

this is by Dr. Bush—

Dr. Bush Feels This Way Now:

In his book Modern Arms and Free Men, published in 1949, Vannevar Bush, head of the Carnegie Institution, of Washington, and wartime scientific coordinator, wrote:

"Dictatorship can tolerate no real independence of thought and expression. * * * No true fundamental science can flourish long under such a system, no matter what the individual genius many be * * *. Science will eventually become a collection of superstitions and folklore. Men of genius will languish and succumb to discouragement * * *. The system with which we contend cannot even apply science to war in the forms it will take in the future, without mistakes and waste and delay."

Today Bush has modified his views.

But we have had proof that Russia can accomplish things in applying science. Despite all the handicaps, they've built atom and hydrogen bombs, and some pretty doggone good jet planes. After all, if the full effort of Russian technology is devoted to military goals, you can expect results. Can they run the whole gamut of things, including guided missiles and radar? I wonder.

There seems to be no doubt that they, the Russians, are training more scientists than we are. They screen the country for talented kids more than we do. We are enamored of the idea of mass education. Curiously, the Russians, despite communism, extend special privilege to gifted youth, if we can believe anything we hear about them. We, on the other hand, still let too many gifted youths slip through our hands.

The impact of these statements pertaining to the possibilities of the know-how and the will of Russia's scientists and research men to win should alert every Member of Congress to the necessity of adding an amendment to any present act, that will give enough power to some Department or agency to generate a bold, sustaining, and continuous exploration and research program that will develop large enough quantities of all strategic and precious minerals in this country that are necessary in the construction and building of jet engines, aircraft frames, and other military equipment.

At this point, Mr. Chairman, I would like to insert in the record an article from the Time magazine of June 18, 1951, on page 92. That will be ready for tomorrow.

Mr. ADLERMAN. You can supply it.

(The article referred to is as follows:)

[From Time, June 18, 1951]

RAW MATERIALS: KEY TO WORLD REARMAMENT

In the race to rearm, the United States and other nations of the free world have run smack up against a key problem: How should the free world's raw materials be divided? By overlooking this problem, while it tried to grab up a

lion's share of all the strategic materials in sight, the United States has already stirred up a storm of hostility among its allies.

Britain's Harold Wilson quit his Cabinet post as President of the Board of Trade, right after Aneurin Bevan left, because he thought that the United States was starving Britain on raw materials. Said Wilson: "British industry stands disorganized and threatened by paralysis because we have not had our rightful share of the raw materials available." Europeans raised the cry that the United States intends to rearm by crippling the industries of Europe.

The problem is too big for a quick and easy solution. The United States consumes more than 50 percent of the world's strategic raw materials. But the United States is also the world's biggest producer of raw materials. As much as 70 percent of the world supply of molybdenum (used to harden steel for cutting tools) has come from a single mine at Climax, Colo.; the United States produces 90 percent of the world's high-grade sulfur; is the largest producer of copper; exports more cotton than any other country. But in other materials, notably metals like tungsten and cobalt, the United States is a comparatively big user and small producer:

| Commodity | 1950 world production | Percent of 1950 production in United States | 1950 percent of total consumed in the United States |
|---|---|---|---|
| Copper.....tons | 2,741,776 | 41 | 50 |
| Lead.....do | 1,700,000 | 34 | 51 |
| Zinc.....do | 2,010,048 | 45 | 50 |
| Manganese.....do | 3,375,000 | 5 | 50 |
| Tungsten.....do | 8,816 | 22 | 35 |
| Cobalt.....do | 6,500 | 14 | 63 |
| Nickel.....do | 170,000 | ½ | 50 |
| Molybdenum.....do | 15,680 | 90 | 83 |
| Wool.....pounds | 4,000,000 | 3 | 16 |
| Cotton.....bales | 31,400,000 | 52 | 29 |
| Natural rubber.....tons | 2,060,740 | 0 | 39 |
| Tin.....do | 182,560 | 0 | 37 |

In normal times, no one begrudges the United States its big share. In fact, many producers would have no market without the United States. But when war broke in Korea, almost every nation began to grab strategic materials—and the United States grabbed faster than anyone. As the Unied States bought materials for stockpiling prices rose so high that many nations were forced out of the market.

### PRICE GOUGING

This was not all the fault of the United States: many a producer used the shortages to do some price gouging. The most conspicuous example is tin, controlled by a cartel run by tin men of Great Britain, Belgium, Holland, and Bolivia. After Korea, tin jumped from 78¾ cents a pound to $1.82, forcing the RFC to step in and do all the buying for the United States. Said RFC Administrator W. Stuart Symington: "They murdered us on prices." To stop the slaughter, RFC went on a buyer's strike in March, and tin settled to about $1.50. Two weeks ago, Symington announced the United States would not pay more than $1.36 for tin, last week cut the price another 7 cents to $1.29. But price is not the whole problem. Even if every nation could afford to buy, there is not enough of many raw materials to go around.

### EMERGENCY RATIONS

How can the problem be solved? The 25-nation International Materials Conference last week was meeting in Washington to find some friendly method of splitting up the world's raw materials. An allocation plan for sulfur has already been drawn up, and plans are soon due for lead and zinc. The Conference has already sent an emergency supply of 3,000 tons of newsprint to France.

But the conference has one big weakness: Its committees are just factfinding bodies with no power to force an agreement. Some nations which have shouted the loudest at the United States grab for raw materials have stalled the Conference while they did some grabbing of their own. The wool committee has been deadlocked for weeks because Australia, which produces more than 25

percent of the world's wool, will not pool its wool and sacrifice the fancy prices it has been getting at auction. There are other complications. Britain is still shipping such strategic items as electrical and generating machinery to Russia in return for badly needed timber, oats, and barley.

MUSCLE-FLEXING

The United States could probably force the other nations into line by throwing its economic weight around. But the State Department has said "No." It fears that such pressure might crack the fragile United States political alliances. To show that the United States is willing to give as well as take, United States Defense Mobilization Chief Charles Wilson announced a priority plan 2 weeks ago which would pave the way for a workable allocations scheme at the expense of United States civilian production. In a quick trip to Europe, Wilson became convinced that civilian production is about as low as it can be if Europe is to remain afloat economically. This is true notably in Britain. The squeeze on civilian goods will have to come in the United States. Thus, Britian will get a priority to purchase United States copper for its jet planes, even if it means that United States TV set makers must do without it; France will be able to buy molybdenum for its steel plants, even if United States auto production has to be cut back further.

So far the plan is a one-way street. Wilson thinks it should be two-way, that other nations, like wool-rich Australia, should set up similar priority systems to take care of United States needs. Unless this is done, the plan will fail. Then the United States will have only one way to solve the raw materials problem: Flex its economic muscles and push its allies into line.

Mr. SCOTT. I want to call your attention just one moment, if you gentlemen will bear with me for about 5 more minutes.

Mr. Chairman, we can all see from this map that Russia isn't too far from Nigeria, Belgian Congo, Gold Coast in Africa, India, and many other nations where we secure many strategic and precious minerals for our economy during peacetime, as well as war.

We imported 37 percent of our manganese in 1952 from India, 34 percent from Gold Coast in Africa, a total of 67 percent. We produced only 10 percent in this country and 90 percent of that amount was produced in Montana. I might add that we have purchased and imported as many as 42 minerals throughout the world to sustain and support our economy.

Personally, I think Russia in pressing forward her cold war, is playing a very cagey game in trying to make us believe that she would like to take Germany, France, England, Italy, and other countries of Europe. In fact, I do not believe that Russia, under any circumstances, wants to take those countries other than through infiltration and eventually win for communism through the ballot. Russia is anxious to infiltrate and eventually take the Asiatic countries because of the tremendous deposits of raw material and minerals, which actually build a nation strong. Russia knows that we secure 90 percent of our columbium from Nigeria, Belgian Congo, and Brazil. She also knows that we secure most of our cobalt from Belgian Congo. In fact, Russian has pinpointed every known deposit and strategic mineral throughout the world.

My point is that if Russia should ever become involved in war with us and our allies, they would not only strike our key cities, such as New York City, Detroit, Pittsburgh, St. Louis, and all other cities where the manufacture of war materials are located, but would, at the same time, fly direct to each and every country that has been furnishing raw materials and minerals to us, and destroy all those mines and deposits at the same time that they are bombing our strategic cities.

My point is, that the problem of finding, developing, and doing metallurgical research on minerals, such as columbium, manganese, cobalt, tantalum, titanium, nickel, and any and all minerals that can be discovered here in this country. A bold, sustaining, continuous program must be inaugurated and carried forward under the management of a Commission of at least three Commissioners appointed by the President and approved by the Senate, or a Director appointed by the President to have power equivalent to the Atomic Energy Commission in order to cut redtape, remove restraints, and make contracts with many corporations, research foundations, and institutes and universities who have the facilities and men with the know-how to do a thorough job in finding, mining, and doing metallurgical research with and through mining corporations, individuals, or any group that deserves the Government's assistance. In fact, the Government must take the lead in this matter.

As I stated before, it would be rather ironic if we produced ample supplies of atomic and hydrogen bombs, in fact, maybe lead Russia in the production of these two most destructive bombs and lag, or fall behind Russia in the production of our strategic minerals that are so essential in the manufacture of jet bombers and airframes and other strategic war materials.

Before closing my statement, may I take this opportunity of stating that I think the Bureau of Mines and the United States Geological Survey have, without a doubt, given as fine service to our Government and their people or any other two agencies in the Government. They have never had enough appropriation and manpower to do the job that they are capable of doing, during peacetime. The agencies have always been hard-pushed to keep some of their men, because of better pay offered by corporations, research foundations, and institutions. Their men have great pride in their work and could be much more effective in developing a well-balanced program of finding, exploring and processing minerals and metals if they had ample money and more manpower.

MAGNET COVE

I did not come here to make any observation or any reference to the deposits that we have in Arkansas, the Magnet Cove, but because of statements made by Mr. Blue, Mr. Knickerbocker, and Mr. Kaiser, I am going to make 2 or 3 observations on our property. I cannot understand why these 3 gentlemen made the statement that they did not think additional exploration work should be done before the Bureau of Mines solves the metallurgy of the problem. I did not come here to make any reference to the property owned by our corporation, as I am interested in a new Commission or a Director with full authority to strike out on a bold, sustaining, and continuous exploration, drilling, and metallurgical program and research on any and all minerals that can be found in this country that will make us as independent as possible to foreign nations in case of war.

I might add that Magnet Cove's titanium deposit has great potential possibilities of supplying a large quantity of titanium (rutile) columbium, and vanadium to our economy in peacetime and war if certain metallurgical research can separate these minerals that will save all of them for our economy, and a new process that can refine

titanium into the finished metal at much less cost than the Kroll process now used.

Mr. Chairman, you asked the direct question as to how many holes were cored by the Bureau of Mines in 1948.

In 1948 there were 27 holes core drilled by the Bureau of Mines.

Mr. ADLERMAN. Over what area?

Mr. SCOTT. In the Magnet Cove area where our property is located. In fact, these holes were all drilled on our property.

Mr. ADLERMAN. How many acres does that cover?

Mr. SCOTT. We own 207 acres in fee and 306 acres in lease, or 513 acres total owned and controlled by the Magnet Cove Titanium Corp. The core drilling in 1948 did not cover the full 513 acres; 187 feet was the deepest hole drilled, and titanium was found in bottom; in fact, ore was found in bottom of practically all of the 27 holes core drilled.

At that particular time, the Bureau of Mines or anyone else did not anticipate that columbium was contained in the titanium (rutile). The Bureau of Mines shipped 400 cores to Rolla, Mo., and kept them.

After Norman Williams, our State geologist in Arkansas ran across columbian at another point, they notified Washington, and they knew that there was a great deal of titanium on the property owned by our company and also on the Christie property that is now controlled by the National Lead. They knew that columbium has had an affinity for titanium. They didn't know how much titanium might be where Norman Williams, the State geologist, found the first columbium.

I called Mr. Knickerbocker in Washington, D. C., a little more than 2 years ago, and asked if they knew there was columbium in the Magnet Cove area, or on our property. At that time he had not had the information. His first reaction was: "Scott, I can take those 400 cores and do additional analyses on them and see what content of columbium can be found."

We made an application to do additional exploration with the DMEA. I literally begged and pleaded with different agencies in Washington; I pulled every string possible; I used all the power that I could muster to jar this application loose, because the State had pride in the fact that their State geologist, Mr. Norman Williams first discovered columbium close by our property.

The State geologist of Arkansas came to us and asked permission to file application with the DMEA for our corporation. We did not seek them. They were going to pay the 10 percent and the DMEA at that time advanced 90 percent.

One of the geologists associated with the United States Geological Survey unofficially offered a suggestion to Mr. Norman Williams, our State geologist, in preparing the application. We all thought this application would be approved in a very short length of time because of the importance of columbium so essential in the construction of jet engine and aircraft frames.

Mr. Knickerbocker, if I am wrong, on my next statement, please correct me.

The truth of the matter is that the Bureau of Mines had only a small amount of money to core drill this property in 1948. The holes were actually drilled 200 feet apart. There could be a tremendous deposit of ore between 4 holes that are 200 feet apart. Nobody is in a position to know the tonnage of titanium (rutile) from the core drilling that

was done in 1948. I would say that if Mr. Mittendorf, Chief of DMEA was present, or any other reputable engineer, they would state that under no circumstance would they approve any application where the prospector or company proposed to drill the holes 200 feet or more apart. It simply isn't good mining practice. My point is that there could be millions of tons of ore in deposit down to 187 feet that has never been touched or indicated because of the lack of close core drilling.

I was selfish and wanted that application approved. I knew that if they went down 400, 600, 800, 1,000 feet or more and that if titanium (rutile) should continue an average of 4 percent, and in some spots very rich veins could be found, such as an average of 280 pounds per ton in a vein of 14 feet that started at 89 feet and thinned out at 103 feet, that was found in one of the holes core drilled to 187 feet. this could be a tremendous deposit of titanium (rutile), which would interest many large companies.

I do not intimate nor indicate that there are many of those rich pockets containing 280 percent of titanium (rutile) but nobody knows what is below 187 feet.

Mr. Chairman, 17 years ago Mr. Blue, Mr. Knickerbocker, and you could have bought the barite deposit, which is close to the Magnet Cove titanium property, for $15,000, and of course we all know there is no relationship at all between barite and rutile. This is known as the largest active barite deposit in the United States. Mr. Murcheson and Mr. Golden, respective managers of the National Lead Co. and the Magnet Cove Barium Corp., told me that they had mined fewer than 100 acres during the 15 years and the 2 companies combined were shipping 36 cars of drilling mud each and every day. National Lead is mining barite at approximately 1,000 feet and Magnet Cove Barium Corp. is doing shaft mining several hundred feet deep. No one had the least idea as to the quantity of this barite deposit until it was core drilled. No one has the least idea as to the tonnage of titanium (rutile) on the property of the Magnet Cove Titanium Corp. until it is core drilled.

Crane & Co., Union Carbide, Fan Steel Metallurgical Research, Kenmetal Co. of Latrobe, Pa., and many other companies with the know-how, facilities, and money, would have become intensely interested and would have been glad to have done metallurgical research at their own expense if big tonnage of titanium (rutile) could have been announced after a thorough job of core drilling had been done.

I have said entirely more than I had intended to pertaining to our own property: in fact my original statement that has already been presented to this committee did not say one word directly, or indirectly pertaining to our holdings. I only brought it up after it was stressed by three witnesses that metallurgical research should be accomplished before additional core drillings should be done on our property.

This statement was all uncalled for, because the application of the Magnet Cove Titanium Corp. had never been mentioned by any witness, nor has it been mentioned by me in my original statement. I did not come to this committee to seek help from it, nor the Bureau of Mines, nor the United States Geological Survey, nor the DMEA pertaining to the application of the Magnet Cove Titanium Corp. It is unfortunate that that question was even projected in the hearing.

No one doubts the ability and the sincerity of the Bureau of Mines in doing metallurgical research on concentrates from our property, but, on the other hand, it has been brought out in the hearing that titanium has occupied the attention of Du Pont, National Lead, Titanium Alloy, Horizon, a research company, and others in trying to develop a new process other than the Kroll process, which is expensive, to refine titanium mineral into titanium metal. Those companies have worked years in trying to develop a new process.

Even the Navy thought enough of the importance of seeking a new process that it made a contract with the Horizon Co. of Cleveland.

There should not only be the Bureau of Mines of Rolla, Mo., doing metallurgical research, but there should be several corporations, research institutes and groups working not only on concentrates from our property but on any deposit of strategic minerals that are found by the Bureau of Mines or mining companies. As I said, the Bureau of Mines, as a Government agency, has been handicapped by the lack of money and manpower in order to do a thorough job for our country. I think your committee could well afford to recommend more manpower and more money.

I have just one other thing and I am through:

Mr. Chairman, your committee has a golden opportunity to render as great a service to your Government and your people as you ever have, if you are successful in seeing machinery set in motion that will give us ample supply of these most strategic minerals and metals that are so sorely needed in the development and building of jet engines, aircraft frames and other war material.

I am willing to answer questions. I wanted to make this record.

Mr. ADLERMAN. Mr. Scott, I want to thank you very much for your very clear and very ample statement that you made. I think it has been a very well prepared statement.

I would like to ask Mr. Knickerbocker whether he has any comments to make on Mr. Scott's statement.

## FURTHER STATEMENT OF R. G. KNICKERBOCKER, CHIEF, MINERALS TECHNOLOGY DIVISION, REGION VI, ROLLA, MO., BUREAU OF MINES

Mr. KNICKERBOCKER. None at all. I think he stated answers to the questions in connection with the number of drill holes, on which I am not informed.

I believe that during my time there have been under my supervision before I came in the Government, starting then; the Magnet Cove deposit was worked and operated by my brother-in-law from about 1932 to 1942.

The tonnage of ore excavated under property which Mr. Scott now owns, the metallurgy of the extraction of the rutile is very complex.

Mr. ADLERMAN. You are working on that now, are you?

### SUBMARGINAL ORE

Mr. KNICKERBOCKER. I am talking about the recovery of the rutile. I am not talking about the research that we are doing in the Bureau of Mines at this time. I am talking about the economic value of Magnet Cove deposit as I knew it, before I came into the Government.

This is from 1932 to 1935, in which I operated that property as a private engineer for an oilman in Tulsa.

I produced the first carload of rutile concentrates from that property, and it is not a high-grade property, as I have told Mr. Scott many times before. It is a submarginal rutile property. I know that from actually developing it, mining it, and knowing the material. I don't have to ask anyone.

Mr. ADLERMAN. You say it is submarginal. Where you have a vast ore body as large as that, isn't it possible that there might be some way of treating it on a very large scale, so that it might be payable?

Mr. KNICKERBOCKER. Well, I can only offer the testimony that DuPont has not considered it so, and they have examined the property.

I am talking now as a metallurgical engineer, and before the development of titanium. The property I am talking about is being talked about in regard to rutile now, as a mineral, and that property is submarginal, in my opinion. You have other minerals which are easier, other supplies of minerals, which are easier. There are other deposits in the same area which are higher grade.

The Christie property is a higher grade property than the Magnet Cove.

Mr. ADLERMAN. With the uses of rutile, as far as production of titanium is concerned, would it pay to take that grade rutile and try to reduce it to titanium oxide?

Mr. KNICKERBOCKER. I don't think it would compete with the other sources of rutile at the present time.

Mr. ADLERMAN. Will it compete with ilmenite?

Mr. KNICKERBOCKER. It probably will.

Mr. ADLERMAN. If we get into a large scale production, won't we need ilmenite as our source?

Mr. KNICKERBOCKER. It has a distinct value.

Mr. ADLERMAN. If this will compete with it, it would seem that this property might be of value then, for the production of titanium ores?

Mr. KNICKERBOCKER. Oh, yes; it has a potential.

Mr. ADLERMAN. In competition with ilmenite, in the production of titanium if the production ever gets up large enough?

Mr. KNICKERBOCKER. Yes.

Mr. ADLERMAN. And the columbium would be what? A byproduct?

Mr. KNICKERBOCKER. A byproduct of the titanium metal production.

Mr. ADLERMAN. And which would make it still more valuable, is that correct?

Mr. SCOTT. I might add that rutile from this property has not up to the present time been suitable for welded rod coating. After it was discovered that columbium was meshed in with the rutile, the first reaction of two National Lead men and also Mr. Knickerbocker was that possibly the element of columbium in the rutile had a chemical reaction that kept it from being used for welded rod coating. Is that right?

Mr. KNICKERBOCKER. No, sir, if you produce titanium tetrachloride to make titanium metal you have no rutile left. In order to get the columbium out you destroy the rutile as a natural mineral. We can-

not separate the columbium and still have the rutile. They are in solid solution with the titanium. I don't believe that is possible.

Mr. ADLERMAN. You mean you could ouly take one of the ores. You cannot have both?

Mr. KNICKERBOCKER. You cannot separate the rutile from the columbium. You can separate the titanium from the columbium but not the rutile. Rutile is the mineral.

Mr. ADLERMAN. I am not an engineer, as I say.

Mr. KNICKERBOCKER. Maybe I can give you an example of a solid solution—the first one that I had.

If you take a cup of coffee and put some sugar in it you dissolve that sugar in the coffee, and if you freeze that cup of coffee you will have the same thing that you have with these two ores. That is a solid solution. You have a solid solution of the columbium. It is dissolved and frozen in the rutile. If you go through the chemical process to take out the columbium, you have dissolved the crystal rutile in separating it.

Mr. ADLERMAN. Thank you very much.

Mr. SCOTT. I want to say that I have never had anyone cooperate better, as far as I am concerned, than Mr. Knickerbocker has done on this whole project all the way through.

Mr. ADLERMAN. There is always room for differences of opinion on these things.

Mr. SCOTT. I don't recall of ever bringing up about the core drilling of this property in this meeting. I did not come here for that purpose.

Mr. KLINE. We might point out on core drilling that the Bureau of Mines does not do core drilling any more.

Mr. SCOTT. I appreciate that. It is a fact that you made the statement that you didn't think any additional money should be spent on the exploration phase of Magnet Cove property until the metallurgical process is developed that will separate these minerals. I approved that part of your statement.

May I state that I have been successful in getting four well-known companies to agree to do metallurgical research on concentrates as soon as they can be obtained from the Bureau of Mines without any cost to our company. The Elector-Metallurgical, Crane Co., Fansteel Metallurgical Research of Chicago, and Kenmetal of Latrobe, Pa., are the companies willing to accept the concentrates as soon as they are ready.

Mr. KNICKERBOCKER. We don't intend to make welding-rod grade rutile because we lose a lot of the rutile in this production of titanium metal. We are interested in the maximum recovery and we did not intend to make much over 60 or 70 percent.

Mr. ADLERMAN. They want a 92.

Mr. SCOTT. I am talking about doing metallurgical research to try to separate the columbium from the titanium.

Mr. KNICKERBOCKER. The titanium is dissolved in the columbium because they are mutually soluble. You cannot separate the columbium from the titanium without going through a chemical process.

Mr. SCOTT. That is what you are doing at Rollo.

Mr. KNICKERBOCKER. Not at the mill.

Mr. SCOTT. I say get the concentrate from the pilot plant if you are going to up the grade.

Mr. KNICKERBOCKER. The mill cannot up it to that grade.

Mr. SCOTT. Are you going to up it enough there?

Mr. KNICKERBOCKER. We have already done it on a laboratory scale.

Mr. SCOTT. Are there some of those concentrates that you spare for those interested companies who are willing to do metallurgical research?

Mr. KNICKERBOCKER. We don't work on a pound basis at all. We have developed that process in the beaker size entirely, on a gram basis. I think I am even either not understanding you or you are not understanding me.

Mr. ADLERMAN. Gentlemen, I am just going to break in here. It is 20 minutes to 8 and I know you have all been pretty late on this thing, and I suppose that you, Mr. Scott, could speak to Mr. Knickerbocker later.

Thank you all for staying so late. We will recess, subject to call.

(Whereupon, at 7:40 p. m. the conference was recessed, subject to call.)

# MISCELLANEOUS STRATEGIC RAW MATERIALS OF AGRICULTURAL ORIGIN



39888—54—pt. 9——22

# STOCKPILE AND ACCESSIBILITY OF STRATEGIC AND CRITICAL MATERIALS TO THE UNITED STATES IN TIME OF WAR

## Miscellaneous Strategic Raw Materials of Agricultural Origin

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MONDAY, MARCH 15, 1954

UNITED STATES SENATE,
SPECIAL SUBCOMMITTEE ON MINERALS,
MATERIALS, AND FUELS ECONOMICS OF THE
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*Washington, D. C.*

The subcommittee met, at 1:30 p. m., pursuant to call, in room 224, Senate Office Building, Senator George W. Malone (chairman of the subcommittee) presiding.

Present: Senators Malone and Watkins.

Present also: Jerome S. Adlerman, counsel to subcommitee; George Holderer, subcommittee staff engineer.

Senator MALONE. The subcommittee will be in order.

Mr. Secretary, we are glad to have you here today, and I am sure that you know the general objectives of the Senate Resolution 143 which directed this subcommittee to determine the availability of the critical materials to this Nation in time of war and to meet our expanding economy and for our security.

The resolution under discussion will be inserted in the record at this point.

(The bill, S. Res. 143, is as follows:)

[S. Res. 143, 83d Cong., 1st sess.]

RESOLUTION

*Resolved*, That the Senate Committee on Interior and Insular Affairs, or any duly authorized subcommittee thereof, is authorized and directed

(1) to make a full and complete investigation and study of the accessibility of critical raw materials to the United States during a time of war;

(2) to study and recommend methods of encouraging developments to assure the availability of supplies of such critical raw materials adequate for the expanding economy and the security of the United States;

(3) to report to the Senate at the earliest possible date, not later than January 31, 1954, the results of its investigation and study, together with its recommendations.

Senator MALONE. Now there are approximately 77 of these materials, many of them in the agricultural field, and the committee feels that while we might have access to the information that it would be much better to have your Department officially cover the subject as regards whether or not these materials are produced in this country

and any suggestions that you might have that would increase the production thereby becoming self-sufficient in the Western Hemisphere.

We also would like, of course, if you would tell us what kind and type of program would be necessary and about how long it would take. We have testimony to the effect that certain materials in conjunction with a 2- to 4-year program certain production can be reached, the estimated cost of the program and the general objectives of it.

I might say to you that we have had testimony from many competent military strategists including General Wedemeyer that the Western Hemisphere will be depended on for the supply in the next all-out war as regards such material; that it will be very problematical that anything can be secured across either major ocean.

Therefore, availability to this Nation in time of war takes on a particular significance. So, Mr. Secretary, if you will proceed in your own way and if you have a prepared statement or if you wish to comment in any way you see fit you may do so.

**STATEMENT OF HON. EZRA T. BENSON, SECRETARY OF AGRICULTURE, ACCOMPANIED BY TRUE D. MORSE, UNDER SECRETARY OF AGRICULTURE; J. MURRAY THOMPSON, COMMODITY STABILIZATION SERVICE; T. R. RAWLINGS, COMMODITY STABILIZATION SERVICE; DR. K. S. QUISENBERRY, AGRICULTURAL RESEARCH SERVICE; DR. H. R. JOSEPHSON, FOREST SERVICE; RICHARD H. ROBERTS, FAS; AND CLAUDE HORN, FAS, DEPARTMENT OF AGRICULTURE**

Secretary BENSON. Thank you very kindly, Mr. Chairman.

Senator MALONE. I might say first that some of us on this subcommittee have a very high regard for you. We think you have the brains necessary to handle your job with integrity, you have already shown that you have a lot of what it takes to get it across to the country, we are mightly glad to have you.

Secretary BENSON. That is very kind of you, Mr. Chairman.

Mr. Chairman, Senator Watkins, members of the staff, my associates, and others, I would like to express my deep appreciation, Mr. Chairman, for the opportunity to appear before this subcommittee to make a statement on the agricultural aspects of the strategic raw materials situation in the Western Hemisphere.

May I indicate that already our Department has responded to the request of the committee and has submitted a written report and some suggestions which we thought might be helpful to the work being done by this important subcommittee. May I also mention that during the past year we have effected some rather far-reaching reorganization plans in the Department of Agriculture.

### RESEARCH PROGRAM IN THE DEPARTMENT OF AGRICULTURE

One of those particularly has a direct bearing on the problems facing this committee, namely, the great field of research. We have brought together in one agency in the Department known as our Agricultural Research Service the research work of the entire Department, and we have tried to give emphasis to research to a greater degree, I am sure, than ever has been done before in the history of that great Department

because we feel that research is basic, not only to any sound longtime farm program but to the very advancement of this Nation economically.

In line with that policy of placing more emphasis upon research, we participated and helped to sponsor a meeting last year in Ohio attended by the research leaders of all the major industries of this country in which we spent a day talking about research and what industry can do to help focus attention and interest and also contribute funds toward a greater and more complete research program in the field of agriculture and particularly in new uses for farm products now produced in surplus and also new products or new crops, which may serve as a basis for producing those materials of which we are short and are dependent on countries far removed from this continent as our source of supply.

In addition to these matters, there is in operation, which has been working very closely with the Department the Farm Chemurgic Council, with which you are familiar. This is a voluntary organization, the purpose of which is largely to develop industrial and other uses for farm products. We are working very closely with that agency. Many industries are interested in the project being carried on, and it serves as a rallying point for diverse groups who are interested in focusing attention on this overall problem of research in agriculture.

Now if I may I would like to proceed with the reading of a brief statement.

Senator MALONE. Go right ahead.

### CASTOR BEAN AND TUNG OIL

Secretary BENSON. The Agricultural Research Service is conducting studies on the growing and improvement of several crops of strategic importance. In oil crops, work is done on both castor beans and tung oil. With respect to castor beans, rapid progress in the research field has been made by developing improved varieties including hybrids and by improving machinery for planting, harvesting, and hulling castor beans.

In 1951 the Munitions Board requested the Commodity Credit Corporation to institute a castor bean production program and agreed to accept for the stockpile all the oil produced. This program was made possible by the research that had already been done by that time in the Department. About 150,000 acres of castor beans were grown in 1953 and this acreage could be expanded if there is a demand. Tung oil production has been expanding for several years and the United States is virtually self-sufficient at the current consumption rate.

### CORDAGE FIBERS—ABACA, SISAL, JUTE

With respect to cordage fibers, the principal source of supply for abaca—I will have to depend on some of my technicians for the pronunciation of some of these words, Mr. Chairman.

Senator MALONE. I will join you in that.

Secretary BENSON. With respect to cordage fibers, the principal source of supply for abaca is the Philippines, although Costa Rica, Panama, Honduras, Guatemala, and Ecuador are now producing abaca to some extent. Production in these Central American countries

was made possible by the enactment of the Abaca Production Act of 1950 which also enabled technicians from the Department's research agencies to continue assisting in the development and production of this important fiber.

In the United States studies are also being conducted on crops to substitute for abaca, sisal, and jute—these are kenaf, sanseveria, hemp, and phormium. The most progress has been with kenaf where production problems are fairly well worked out and progress is being made on harvesting machinery in order to reduce the amount of hand labor. In the event of an emergency, this crop could be grown in the Everglades of Florida, and it is believed sizable quantities could be produced in Cuba, Mexico, Colombia, Haiti, and Guatemala.

### TANNIN

With respect to tannin, about two-thirds of our requirements are obtained from Argentina and Paraguay in the form of quebracho extract processed from mature trees, 100 to 200 years old. About 15 percent of our requirements is imported from South Africa and the balance is obtained largely from domestic chestnut wood. Under emergency conditions it is believed that the United States could become self-sufficient by developing new sources of tannin materials.

Studies are under way with canaigre where there are production problems to be worked out. There is sufficient evidence now available to indicate that this plant would supply tannin which would be usable in the leather industry. Strains of canaigre are now available which contain increased percentages of tannin.

The leaves of the shrub sumac also furnish an additional source of tannin in this country. Large additional supplies of domestic tannin could also be obtained from the bark of a number of timber species, including Douglas fir, western hemlock, oak, and mangrove. There is also some possibility of utilizing chemical tannins in lieu of a portion of vegetable tannin compounds. Development of such new sources of tannin would, of course, entail fairly extensive development of processing plants in this country.

### NATURAL RUBBER

No natural rubber is produced in the United States, but a research program cooperating with countries in Latin America has shown much progress. The wild shrub guayule has shown some promise as a local source of rubber. However, this is a slow growing plant and rubber could not be produced from it economically at current prices. Strains giving increased yields of rubber might change this picture, but processing plants would have to be built.

Observational and some improvement work is being carried on with a number of plants which at present are of less importance than the ones mentioned above.

The Forest Service has been involved in the work on strategic materials for some time. With respect to forest products, other than the tannins already mentioned, the United States is essentially self-sufficient except for a small number of strategic items and for lumber, pulp and newsprint produced in Canada.

SUBSTITUTES FOR STRATEGIC AGRICULTURAL PRODUCTS

Our supply of cork, for example, needed for various civilian and military purposes, is obtained from Portugal and other Mediterranean countries. Most or all of our cork needs in case of an emergency, however, could be met by the use of substitute materials, although construction of plant and equipment to manufacture substitutes might be difficult under emergency wartime conditions and, for certain uses, it would be necessary to use substitute materials that might also be in critically short supply.

Certain types of wood such as teak, mahogany, balsa, and lignum vitae which have many strategic wartime uses, are obtained from overseas sources. All of these items but teak are obtained in the Western Hemisphere. As in the case of cork, however, if such supplies were cut off, reasonably satisfactory substitutes could be found for these materials in the United States.

WHEAT AND UPLAND COTTON

Since the committee included wheat and upland cotton on its list which was transmitted with the request for a report from this Department, I should like to comment on the relationship of these two commodities to the President's farm program. The importance of reserves of these two agricultural commodities and others in the inventories of the Commodity Credit Corporation, for use in case of an emergency, was recognized in the President's farm message transmitted to the Congress on January 11, 1954.

This message stated that—and I quote:

> Removal of the threat of huge surpluses of farm commodities from current markets is an essential part of the program * * * surplus commodities * * * can be insulated from the commercial markets and used in constructive ways. Such uses will include school lunch programs, disaster relief, aid to the people of other countries, and stockpiled reserves at home for use in war or national emergency.

The President recommended that authority be provided to set aside, as a reserve, quantities of certain surplus agricultural commodities to a maximum value of $2½ billion. It was also stated that broad discretionary authority should be provided to manage the set-aside, coupled with legislative safeguards which would assure that disposition of the set-aside would not disturb normal trade.

STRATEGIC RESERVES TO MEET A NATIONAL EMERGENCY

Two proposals currently being considered by the Congress would implement the President's proposal in respect to the set-aside, S. 3052, recently introduced by Senator Aiken and a House committee print dated March 9, 1954, on which the House Committee on Agriculture currently is holding hearings. The provisions of these two proposals pertaining to the set-aside are identical. They would provide for the inclusion of the following commodities in the range shown:

Wheat, from 400 million to 500 million bushels.
Upland cotton, from three to four million bales.
Cottonseed oil, from zero to 500 million pounds.
Butter, from zero to 200 million pounds.

Nonfat dry milk solids, from zero to 300 million pounds.
Cheese, from zero to 150 million pounds.

The conditions under which quantities in the set-aside may be disposed of are clearly outlined in the proposals.

The set-aside would, therefore, provide a reserve of wheat, cotton, and other commodities as stated above which, for all practical purposes, may be considered as a stockpile. In fact, both proposals indicate that quantities of commodities included in the set-aside are available "to meet any national emergency declared by the President." Domestic consumption of cotton currently is running at an annual rate of about 9 million bales, and the annual domestic consumption of wheat is running at about 700 million bushels. These insulated reserves would thus represent a significant proportion of our annual domestic requirements for these commodities and provide additional protection in the event of emergency or war.

The Department, through its Foreign Agricultural Service, has kept in close touch with foreign developments relating to production and marketing of agricultural commodities generally, including a number of strategic materials covered in the Department's report to the committee. These commodities include those which compete with United States production and those which are needed by the United States to complement or supplement domestic production.

In this work and in connection with import restrictions, tariffs and related matters, we have constantly directed our attention to the maintenance and expansion of markets for United States agricultural commodities abroad, while, at the same time, assuring that the interests of domestic producers of agricultural commodities are safeguarded.

The Department maintains constant contact with the technicians and research organizations working in the other countries of the Western Hemisphere. Through these contacts, it is able to encourage the expansion of output of complementary foods, fibers and agricultural raw materials, to promote the introduction of new strains or types of crops, where appropriate; to introduce more efficient crop production methods; and, cooperatively with technnicians of our Agricultural Research Service, to develop effective methods of controlling plant and animal diseases that now, or at some time in the future, may threaten American production of strategic raw materials and other commodities of agricultural or animal origin.

In closing, let me thank the committee for the privilege of appearing before you on this subject. Under Secretary True D. Morse is here to discuss the agricultural aspects of your inquiry further as desired. Representatives of the Department's service agencies are available here for the purpose of responding to any questions that members of the committee may wish to take up at this time. We will also be glad to furnish any additional information the committee may request.

May I add that the facilities of the Department both here and throughout the world are available to this committee if at any time we can be helpful. We recognize the very serious import of the job you are undertaking, and we want to render every possible assistance.

Senator MALONE. Mr. Secretary, I am sure that the full committee will appreciate what you have done here today. As I have already said, the record of your testimony and that of your assistants and

any cross-examination will be available to you and to them for correction or completion, and anything that you would like to include in the testimony after hearing the objectives of the subcommittee today.

Secretary BENSON. I appreciate that, and if there should be questions for which we do not have the immediate answer, we will be glad if you will provide to give us time and we will be glad to provide them if we can.

Senator MALONE. Yes. Now many of these materials, and we find that in the metal field also, have very satisfactory substitutes and replacements, and what we would like to do and what we will do this afternoon through the questioning of your assistants is to try to lay the groundwork for the determination, if you do not already have it in the outline submitted, to what extent can we become self-sufficient in this Nation, to what extent can we become self-sufficient in the Western Hemisphere in that particular product and then what substitutes and what replacements can be utilized and be depended upon and will be available in time of all-out emergency.

There has been a considerable question and will be before the Senate and the House during this session as to how best to encourage the maximum production in the United States proper of these critical materials. In other words, there are minerals such as in your own State of Utah and you have the lead, zinc, copper, tungsten, about the same as my State of Nevada, but it is not confined to the West. We have Michigan and some of the Southern States that have these minerals.

Then it is by no means confined to this type of material. There must be a policy, many of us believe, set down, a long-range policy, to encourage private investment in these materials. Right at the moment naturally no private money would go into the sheep industry, for example; no private money would go into the lead and zinc industry. Those that are in must try to save themselves.

So it comes down to a question whether we continue the last 20 years of the executive department through the State Department making trades, mostly for political advantage with foreign countries or political assistance or whether it should be done on an economic basis as has been for many years through the Congress itself.

The Constitution of the United States of course says in Article I, section 8, that the Congress must regulate foreign commerce and also says that they must set the duties and the tariffs. The 1934 Trade Agreements Act transferred bodily that responsibility to the Executive, and for 20 years these trades have been made, and none of those trades have worked to our advantage or to making us self-sufficient.

The question then is what type of encouragement, whether it shall be subsidies, quotas, or tariffs, or all three, and I would simply leave it to your discretion whether you would express an opinion here today. Many of us believe that the Congress should assume its constitutional responsibility and through the Tariff Commission or any agency they set up on a fair and reasonable basis so that at least there will be a principle of adding to the price the difference between the labor cost and the taxes between this Nation and the chief competing country. It would have to be a matter of long-range principle adopted and administered by Congress because if it is left in the State Department it has shown that it makes these trades for an entirely different reason.

I would ask you, Mr. Secretary, if you have any remarks that you would like to make on that subject at this time.

Secretary BENSON. Well, I do not know that I have any detailed comment to make. I recognize under the Constitution it is vested in the Congress, and no doubt it is a matter the Congress should determine. There is an added reason now, it seems to me, why our agricultural industry particularly would be interested in pushing the development of possible new crops which may figure into our strategic needs, and that is the fact that we are faced, as we all know, with the possibility of removing some twenty to twenty-five million acres from the production of basic commodities.

Immediately there arises the problem of finding use for these diverted acres. We also have a national problem of soil conservation, and it may be that many of these crops could be used in that direction. So now, probably more than at any time in the history of the Department, we are not only focusing attention on the matter of basic research and trying to find new commodities, but we have this added reason which I have just mentioned why we would be very much interested in finding certain commodities or crops needed in our strategic raw material program which would fit into the use of these facilities or these acres which are being taken out of the basic commodities.

Senator MALONE. In other words, any of these present crops that could be used through chemical research to add to the availability of crops now classed as strategic or critical, and then perhaps even new ones beyond that?

Secretary BENSON. Yes. There are many new crops that I did not mention in my very brief statement. In fact, I have a memorandum here which it may be advisable to make a part of the record. I do not know any good reason why it should not be done. It is an interdepartmental memorandum for possible new crops for diverted acres.

Senator MALONE. It would be very helpful.

Secretary BENSON. It goes into detail on a discussion of each of the crops. Some of them may not be considered strictly crops that would figure into our strategic materials program. They include some new plants for the production of certain drug items that we are now importing, as an example. These offer some promise, and of course during the war period they may be very important also.

Senator MALONE. I am not so sure but what it would be helpful because, Mr. Secretary, when one crop is increased another crop may be decreased, and a new crop fills a need that is not otherwise filled, and I think it would help round out the information if you would submit it for the record as a part of your testimony.

Secretary BENSON. I will be glad to do that.

(The information referred to is as follows:)

UNITED STATES DEPARTMENT OF AGRICULTURE,
AGRICULTURAL RESEARCH SERVICE,
*February 11, 1954.*

**To: J. Earl Coke, Assistant Secretary.**
**From: B. T. Shaw, Administrator.**
**Subject: New Crops for Diverted Acres.**

**You requested more information on new crops which might be grown on diverted acres. Research in progress on potential new crops offers hope that we may be able to increase opportunities for diversification of agricultural production patterns. The work has not progressed far enough to offer immediate promise for meeting the current crop adjustment problem. A brief statement on several**

of these crops follows. The attached memorandum from Dr. Quisenberry to me gives more detail.

GUAYULE

Rubber of excellent quality has been produced from cultivated guayule in the United States. Research has developed some new strains which may double the yield of present commercial strains. Five to ten years of research would determine whether guayule could become a practical crop in the arid sections of the Southwest that are marginal for the production of food and fiber crop.

CASTOR BEANS

The 1953 acreage of castor beans was approximately 150,000 acres. The acreage in 1954 could not exceed 200,000 or 250,000 acres if all the available seed was fully used. The current floor price has been established at 6 cents per pound, and there is every indication to show that the acreage will drop considerably. Immediate expansion would have to be limited to the current areas of production primarily in western Oklahoma and northern Texas and adjacent areas in Arkansas and Missouri, and in the irrigated valleys of southern Arizona and central California.

SAFFLOWER

Safflower was grown in California last year and a company plans to contract about 50,000 acres in the same area this year. At most this company has only enough seed for an additional 50,000 acres. Safflower is a drying oil that goes into the hard finish coatings, and to a certain extent is in competition with soybean and linseed oil, although it seems to have some special properties that give it a little advantage in the market. This advantage might not hold for larger quantities of oil.

SESAME

Approximately 1,000 acres of sesame was planted in 1953, and the production is estimated at something over 500,000 pounds of seed. The association acting as a company promoting sesame has propaganda out to the effect that 100,000 acres of sesame will be planted next year. Sesame oil finds its main use as an edible oil in competition with cottonseed oil, soybean oil to some extent, although it appears to have nonrancidity properties valuable in certain cooking oils.

CANAIGRE

Canaigre is the most promising of all plants studied for use as a farm crop to produce vegetable tannins. The crop development and the utilization are only in the experimental stage. There is no commercial production of canaigre. Canaigre production cannot be undertaken until processing facilities are established in areas of production, which now appear to be in the irrigated valleys of southern Arizona.

SUNFLOWERS

The marked outlet for sunflower seed for pet feeding and for human consumption is strictly limited, and probably the present 20,000 to 30,000 acres being produced is all that could be absorbed in this way. Any future development would have to be in the oilseed field, where sunflower oil would appear to compete with other edible oils.

DRUG PLANTS

Drug plant crops, as stramonium, digitalis, henbane, belladonna, etc., are of no consequence in the utilization of acreage for crop production even though they are products vital to our country's well-being. The normal requirements for most any one of these crops can be produced on from 10 to 300 acres.

PYRETHRUM

There is no available seed of pyrethrum in this country and there is no prospect that it could be developed as a crop in competition with dried pyrethrum flowers offered from foreign markets.

KENAF

The United States imports annually about 75,000 tons of raw jute and 250,000 tons of manufactured jute products from India and Pakistan. It has been dem-

onstrated that kenaf is a satisfactory substitute for jute in the manufacture of burlap and twine. It was produced on a commercial scale in south Florida as well as in other areas of the Western Hemisphere in 1950–52. It is estimated that about 200,000 pounds of kenaf fiber and 60,000 pounds of kenaf seed were produced from 2,500 acres in Florida during this period. Present production methods and high labor costs will not permit domestic kenaf production in competition with imported jute.

RAMIE

Ramie fiber is used in the manufacture of automobile and furniture upholstery, linen-type fabrics, blends with wool, industrial packing, fire hose, fish nets, and other specialized articles. The production of ramie was established on a commercial basis in the Florida Everglades in 1943. A little over 3 million pounds of decorticated ramie was produced from about 3,000 acres in 1953. The crop can be grown in several of the Gulf States as well as in the Everglades area of Florida. The present outlook seems to indicate that ramie fiber production will increase gradually.

HEMP

In both World Wars rapid expansion of hemp production in the United States was necessary to provide a supplemental source of cordage fiber. At present a small industry of less than 1,000 acres exists in Wisconsin. Two processing plants are intact in this area; however, only one is in operation. Hemp grows well throughout the Corn Belt, however, it is not at present an economical crop to grow because of the low prices of competitive imported fibers.

SANSEVIERIA

Sansevieria can be used as a substitute for manila hemp in the manufacture of cordage. This fiber has not been produced commercially in the United States. However, there are several areas in the southern part of Florida where climatic and soil conditions may be suitable for the production of the crop. Research on sansevieria initiated in 1942 has progressed to the point where it appears desirable for a limited trial production.

PHORMIUM

Phormium is considered to be a satisfactory substitute for several cordage fibers. It is the one hard fiber crop that grows well in the temperate parts of the United States such as the Pacific coast area between San Francisco, Calif., and Coos Bay, Oreg. If and when commercial production is undertaken, it will probably be limited to national domain land or wasteland not well suited to cropping.

In our new crops project many potential plants are being studied, some of which may have possibilities in the United States. A few examples are presented:

Perilla oil is obtained from a plant, several varieties of which grow in India and Eastern Asia.

Chia seed oil is derived from a herbaceous plant belonging to the mint family, Salvia hispanica. It is a native to Mexico and Southwestern United States.

Cassia oil normally comes from the twigs and leaves of a tree native to eastern Asia but which will thrive under conditions of Southeastern United States.

Candelilla wax comes from a herbaceous perennial growing in the desert areas of Mexico and Southwestern United States.

Jojoba wax comes from the shrub simmondsia. Industry is very much interested in attempts to put this shrub under cultivation if at all possible, so that a steady source of jojoba oil would be available. It will be tried in southern Arizona and southern California. It is a marginal land plant and irrigation will be needed only to start the plants.

Bamboo: Over a period of the past 20 years, we have demonstrated that the timber bamboos will thrive under conditions as found over a large part of Southeastern United States. We believe that bamboo will become an important source of paper pulp, as well as structural material, when industry learns enough about this plant's peculiarities to consider it a business potentiality.

Cortisone: In an attempt to find a plant source for chemicals which can be used to produce the very important drug cortisone, the tropical yam, dioscorea, appears to have possibilities.

Black pepper: Commercial source for all of this important spice is at present southern Asia. We believe at present high prices black pepper is a feasible crop

for consideration in Puerto Rico and we are now bringing in good stocks from Asia to investigate its possibilities for commercial development in Puerto Rico.

B. T. SHAW.

Senator MALONE. Mr. Secretary, on imports when there is no control of imports whatever, practical control as a matter of fact of wool, or the matter of crop where we produce more than we need, do these imports aggravate the situation at all? That is to say, because even more land goes out of cultivation or use here?

Secretary BENSON. Well, of course one of the real problems we have under our present support program is the fact that these support prices tend to attract to our shores in increasing quantity products from abroad. Of course, we do have legislation under section 22 that provides that when such conditions appear that the Tariff Commission will be directed to make a study and determine the findings.

It certainly does tend to complicate matters, particularly on commodities which we are producing in apparent surplus under these high rigid supports to have items imported in competition, and of course when the items are imported in competition even when the products are not in surplus it tends to replace a certain number of acres naturally.

Senator MALONE. Well, does it tend, too, to prevent private investments over a long-range period in trying to furnish the material that we need in this country; that is, free imports?

Secretary BENSON. Yes; I think that would be true. I think there is another phase of this that I did not mention in the statement which probably ought to be made a part of the record, and that is the fact that we are interested in various types of research that have to do with increased production of all types of agricultural commodities because during a period of emergency our farmers are usually called upon to produce to the maximum, and so the use of fertilizers and chemicals, machinery and the improvement of those constantly is a basic part of our research program because they do contribute substantially to increased production during an emergency period.

Then of course on some of these new commodities you are immediately faced with the problem of developing new machinery to meet the needs of the new commodity. So in the machinery field as well as the fertilizer and chemical field we are carrying on research.

Senator MALONE. Mr. Secretary, looking forward to a war, which of course if we knew we would have perpetual peace no one would be worried because you can always get your materials from some place, but if we are living through a dangerous period, if we were to face a 4- or 5-year all-out war, it could possibly be that we would be furnishing agricultural materials to some South American nations, could we not?

Secretary BENSON. It is entirely possible.

Senator MALONE. They import certain agricultural products?

Secretary BENSON. Yes; and we get some from them, too. I think anything we could do to strengthen the trade between our friends to the south would be all to the good both in time of peace as well as war.

Senator MALONE. I have said many times through my engineering experience of about 30 years before coming here that our trade future, if we have any, is with South America and Asia, not with old Europe.

What you say is water on that wheel. In other words, they are the raw material producing countries at the moment, and we are the manufacturing and processing area as Asia is a raw material producing country. We just sort of complement each other, do we not?

Secretary BENSON. Yes; I think there is a great tendency in that direction. Of course, trade generally should be inclined in that direction.

Senator MALONE. Well, I have said before now, and of course this is just between 2 friendly westerners, to try to force trade between 2 manufacturing and processing areas like Europe and the United States, where when 1 produces something and sends it to them we must produce that much less it is a good deal like 2 barbers trying to make a living in the same block shaving each other.

Senator Watkins?

Senator WATKINS. I may just reveal my ignorance, but to what extent can vegetable oils and other products be used to invade in the field of minerals? Not only invade but supplement the supply of mineral oils for strategic use?

Secretary BENSON. I do not believe, Senator Watkins, that I am qualified technically to answer that. Maybe some of our men are able to comment, but I do not feel I am qualified.

Senator WATKINS. Just take vegetable oils, for instance.

Senator MALONE. Senator, if you have anything to ask of the Secretary, he must leave right away, and then we will keep the remainder of the personnel here.

Senator WATKINS. I must leave in a few minutes myself.

Secretary BENSON. We will try to get an answer on that, Senator Watkins. Of course, that comes into the field of the castor bean as one example, does it not?

Mr. RAWLINGS. That is correct.

Dr. QUISENBERRY. Yes.

Senator WATKINS. I wanted to ask that one question of the Secretary.

Senator MALONE. Then, Mr. Secretary, we will not keep you any longer.

Secretary BENSON. Mr. Morse and members of the staff will be happy to remain.

Senator MALONE. We appreciate your help. Thank you very much.

Which one of you gentlemen can answer Senator Watkins' question?

Dr. QUISENBERRY. The vegetable oils have special uses to which the mineral oils are not so well adapted. In the case of the castor beans, there is need for castor oil as a lubricant in certain engines and other uses for low-temperature oils. In some cases, such as in plasticizers and plastics, products made by chemical modification of vegetable oils and animal fats can be substituted for products made from mineral oils. For that reason it is felt that there is a need for the vegetable oils as well as mineral oils.

Senator WATKINS. Would it be with only that one particular product?

Dr. QUISENBERRY. I am speaking primarily of the castor bean in this case. Then we have the tung oil, which is a drying oil which has certain uses in paints and varnishes. The mineral oils are not used in this case.

Senator WATKINS. I am getting over into another field. What about the other vegetable products that might take the place and in the past war did take the place of minerals? I am speaking of the synthetics so far as plastics?

Dr. QUISENBERRY. I do not believe I am qualified to answer that question, sir.

Senator MALONE. Any question that Senator Watkins may have I hope you will make a note of it if none of you have the answer now and send it in to the committee.

Senator WATKINS. Perhaps it is a foolish question.

Senator MALONE. We want it.

Senator WATKINS. For instance, in the construction of various types of war equipment, plastics made from vegetable material that help as a substitute for minerals.

Dr. QUISENBERRY. Some of these vegetable oils are used as the basic source of certain acids that are used in the making of plastics, and plasticizers.

Senator WATKINS. Some of the plastic material itself is directly taken from vegetable matter, is it not?

Dr. QUISENBERRY. That is correct.

Senator WATKINS. That can enter into the construction of certain types of equipment?

Dr. QUISENBERRY. That is right.

Senator WATKINS. Then of course we have the well-known example of alcohol made from vegetable matter that goes into the manufacture of synthetic rubber?

Dr. QUISENBERRY. Yes.

### AGRICULTURAL PRODUCTS AS A SUBSTITUTE FOR CERTAIN STRATEGIC AND CRITICAL MATERIALS

Senator WATKINS. Has the Department figured on having some of this grain and other vegetable matter stored for such use?

Mr. MORSE. I believe not specifically for that use. Our production capacity in relation to current consumption is such that we have assumed until there was a more immediate threat of war that beyond this stockpile or set-aside provision which has been recommended to Congress that we would not be moving in that direction. However, we are under the guidance of the Office of Defense Mobilization. We have no plans beyond the proposed set-aside as set forth in the President's message on agriculture.

Senator MALONE. What is your backround, Mr. Morse, if you will give it to us for the benefit of the record?

Mr. MORSE. I farmed for some 5 years between high school and university. I took a degree in agriculture at the University of Missouri.

I served on the agricultural extension staff for a short time, of the university.

Then I joined the staff of the Doane Agricultural Service in St. Louis. This organization is engaged primarily in farm management, land appraising, and as consultant to industrial organizations, financial organizations, and others serving agriculture.

I served with that organization for over 26 years and came directly from there to the post of Under Secretary of Agriculture.

In the course of my employment, I worked broadly throughout the United States with agriculture and helping with farm management problems. The company I was with managed land in some 15 to 20 States, which gave me a firsthand knowledge of the problems of farmers and their opportunities in agriculture.

Senator WATKINS. There is the use of grain, for instance, to make one of the materials that go toward making synthetic rubber.

Mr. RAWLINGS. As I understand, sir, the older hot rubber process which did use a lot of raw alcohol is being replaced with the newer cold rubber type of process which does not use the raw alcohol, and that was the coconut oil which you might have mentioned.

### LARD AS A SUBSTITUTE FOR PALM OIL

Back to the general subject, I think Dr. Quisenberry might like to mention about the fat that is used in cold rolling of tin and plate where heretofore we had been using African type palm oil which did come from out of the Western Hemisphere.

Dr. QUISENBERRY. Go right ahead.

Mr. RAWLINGS. The Agricultural Research Service has done quite a bit of work there where we think we can go a long way in using lard. I do not know the technical aspects of it, but there are bulletins on it which indicate that you can use that in place of palm oil which has been used in the cold rolling of steel and intin and terneplate. That is one place where we have used an agricultural commodity to replace something which is hard to get during a war period, like palm oil.

Senator WATKINS. How about animal fats? Of course, you just described one, but what about explosives, do you use animal fats in explosives?

Mr. MORSE. Glycerin?

Mr. RAWLINGS. I am sorry, I cannot answer that. The only thing we have is coconut oil on which we have done quite a bit of work, but we do not produce it in this country; it is used to produce napalm for the fire bomb.

Senator WATKINS. What about what Mr. Morse just said, glycerin?

Mr. MORSE. The animal fats often become short in time of war. I am not a technician on that, but I understand it is because of the demand for explosives.

Senator WATKINS. We seem to have a surplus now of animal fats, and since we are in this field I wanted to tie it in with taking the place of some mineral products that this committee is more directly concerned with to see what, if any, contribution agriculture can make with the plant growth or animal production.

Senator MALONE. The resolution makes no distinction, Senator Watkins. We are just as concerned with the agricultural products as the mineral products. Any critical material, which means that we do not in this Nation produce all that we use.

Mr. MORSE. Here again we ought to get the information into the record, and we will in regard to the animal fats. Animal fats and vegetable oils can be chemically modified for use in plasticizers and plastics as substitutes for products obtained from mineral oils. We have switched, as we all know, from the acute shortages in the war both in edible and nonedible fats until we have surplus. One contrib-

uting factor to that has been the substitution of detergents for use of the fats in soaps and cleaning fluids.

Senator WATKINS. We actually have a surplus, do we not?

Mr. MORSE. Butter, vegetable oils, and nonedible fats particularly are in acute surplus. There has been some strengthening of the markets in oils and fats in recent months, but they are in ample supply. We are encouraging the production of hogs that carry less fat. We are questioning the development of high fat and tallow beef animals because so much of it is discarded and brings such a small price.

We have the situation where in peacetime we do not want so much fat and in past wars we have run acutely short.

Senator MALONE. Does that make a better beefsteak if you build it with fat on it?

Mr. MORSE. Well, that is a matter of taste. After you go beyond a certain point the nutritionists tell us that there is not a major difference. Even an animal well fattened on grass supplies both good taste as well as nutrition, but there is demand for highly fattened beef.

I might say further that the production of fats in this manner, animal fats, is a very costly process through full feeding. After you go beyond a certain point it is very costly to produce animal fats.

Senator WATKINS. I do not have any further questions. I am sorry, Senator, that I have to leave for another hearing.

Senator MALONE. I am sorry you cannot stay. We would like to have you here. I think this is a very important part of the work of the committee. I wanted to make that clear because some reporters at first thought it was just a mineral committee, but there are about 77 such materials and less than half are minerals.

In the field of agriculture these nonmineral products are of great importance. I was very much interested in conversation with the Secretary that you were already preparing for an intensive research program for uses of commodities that might be considered surplus now, and that some of these uses that might develop may reach into the strategic field.

Mr. MORSE. Yes. I would like to emphasize a point on which the Secretary touched as far as defense is concerned, and that is to be ready for production and have our land resources in shape for expanding production. We have seen that need in two major world wars and how land has been taken out of grass and put into crops, and soil fertility reserves have been drawn on so as to get a rapid expansion of production.

Now that we have moved into a peacetime period or are approaching peace, we are very much concerned that we get some of the cropping withdrawn from the acres that should not be continued in crops. We should get such land built up and ready to produce when the production is needed again. It seems to me that that is one of the most effective defense measures that we could possibly have.

Senator MALONE. At this point I believe we should insert, before the Secretary's statement, the group I nonminerals and the group II nonminerals that are shown in our list here.

(The information referred to is as follows:)

LIST OF STRATEGIC AND CRITICAL MATERIALS

GROUP I. ACQUIRED BY PURCHASE

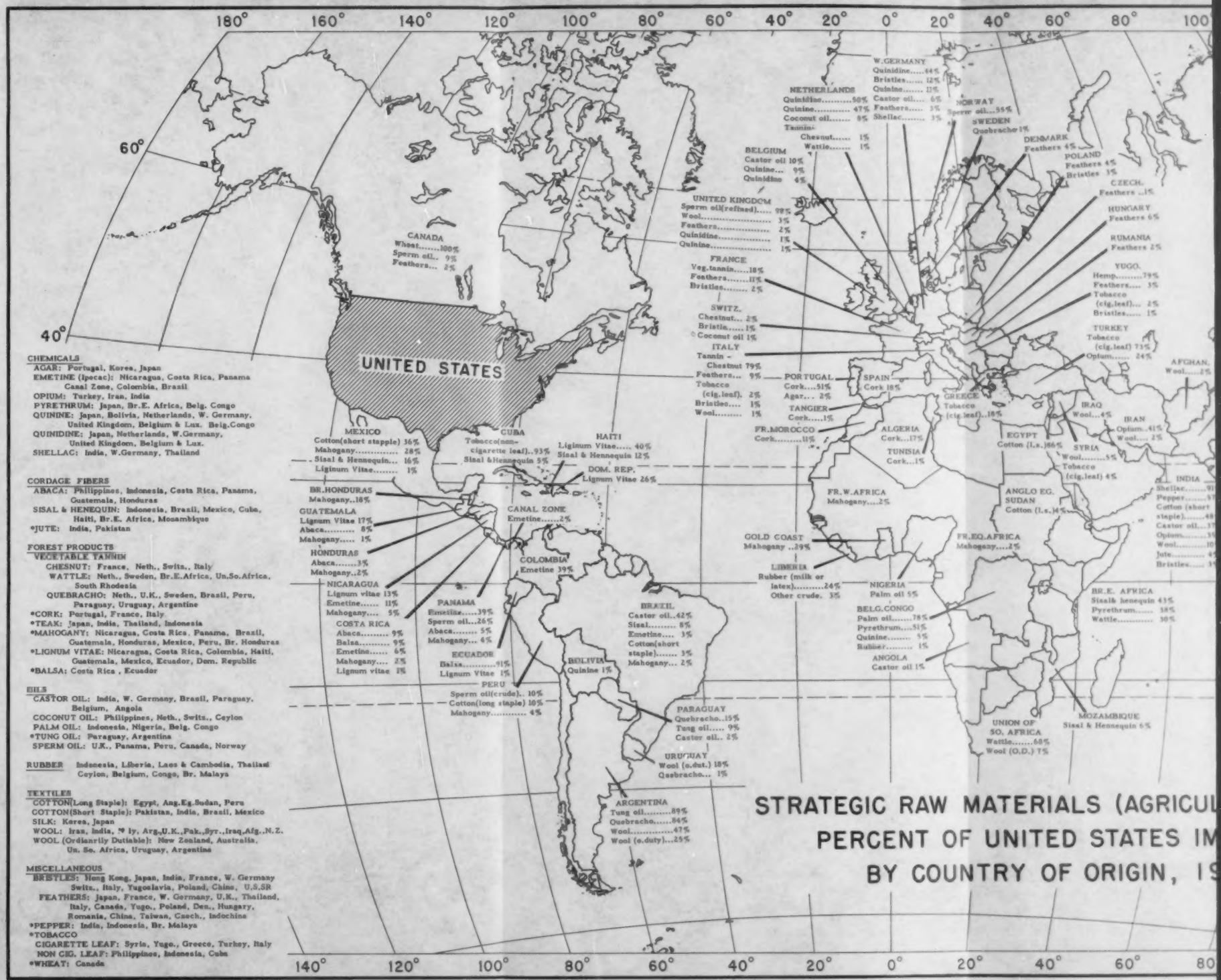
Abrasive crude aluminum oxide.
Aluminum.
Antimony.
Asbestos, amosite.
Asbestos, chrysotile.
Asbestos, crocidolite.
Bauxite, metal grade.
Bauxite, refactory grade.
Beryl.
Bismuth.
Cadmium.
Celestite.
Chromite, chemical grade.
Chromite, metallurgical grade.
Chromite, refactory grade.
Cobalt.
Columbite.
Copper.
Corundum.
Diamonds, industrial.
Fluorspar, acid grade.
Fluorspar, metallurgical grade.
Graphite, amorphous lump.
Graphite, crucible grade
Graphite, lubricant and packing grade.
Kyanite.
Lead.
Magnesium.
Manganese ore, battery grade.
Manganese ore, chemical grade.
Manganese ore, metallurgical grade.
Mercury.
Mica, muscovite block, good stained and better.
Mica, muscovite block, stained (radio tube quality).
Mica, muscovite film.
Mica muscovite splittings.
Mica, phlogopite splittings.
Molybdenum.
Nickel.
Platinum group metals, iridium.
Platinum group metals, platinum.
Quartz crystals.
Rare earths.
Selenium.
Tin.
Titanium.
Tungsten.
Vanadium.
Zinc.
Uranium.
Thorium.

*Nonminerals*

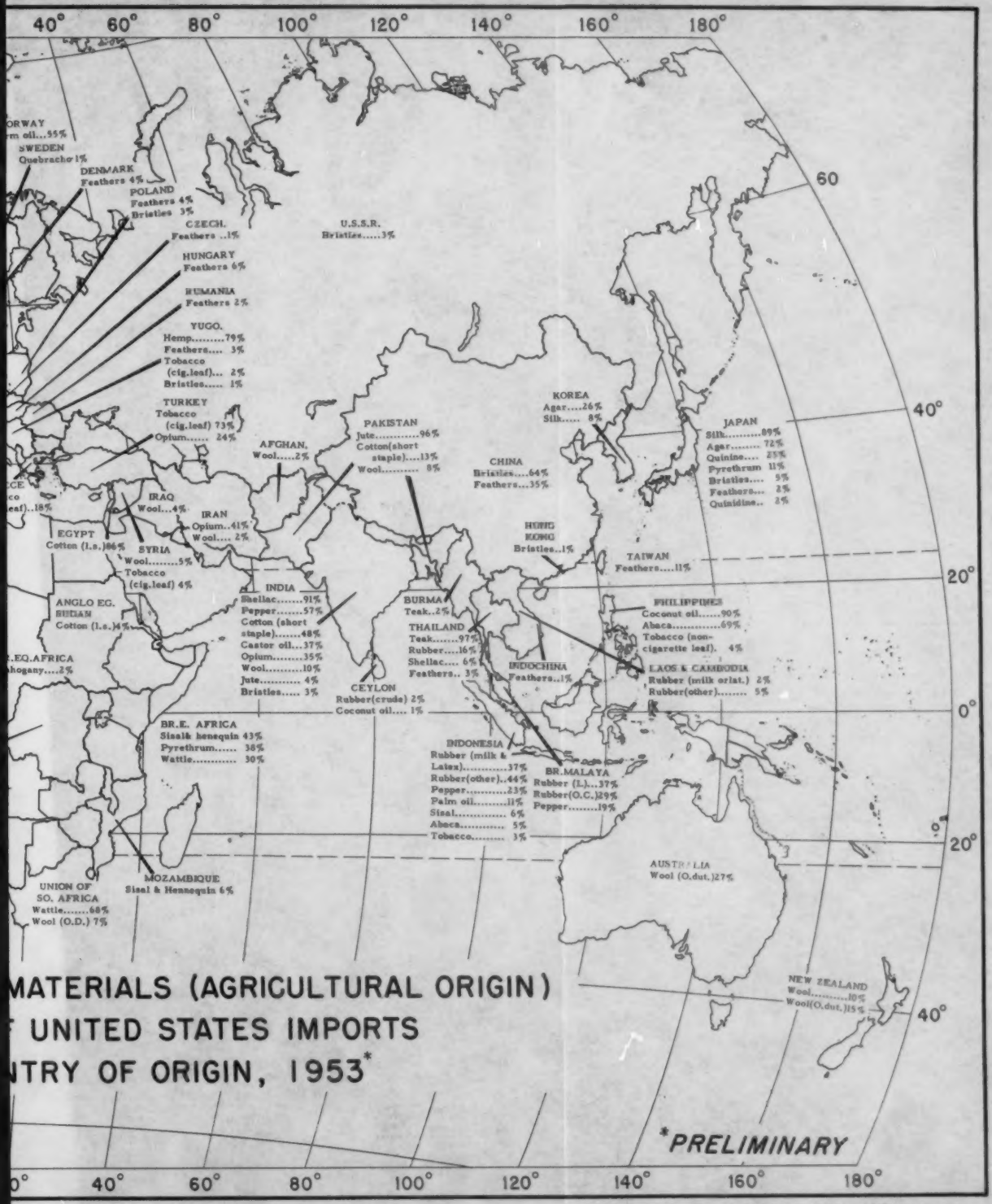
Bristles, hog.
Castor oil.
Coconut oil.
Cordage fibers, abaca.
Cordage fibers, sisal.
Cotton, extra long staple.
Feathers and down, waterfowl.
Hyoscine.
Iodine.
Jewel bearings, instrument jewel except vee jewels.
Jewel bearings, sapphire and rubby vee jewels.
Jewel bearings, watch and timekeeping device jewels.
Opium.
Palm oil.
Pyrethrum.
Quinidine.
Quinine.
Rubber, crude natural.
Sapphire and ruby.
Shellac.
Silk.
Sperm oil.
Talc, steatite, block.
Vegetable tannin extract, chestnut.
Vegetable tannin extract, quebracho.
Vegetable tannin extract, wattle.

GROUP II. ACQUIRED BY TRANSFER OF SURPLUS MINERALS

Bauxite, abrasive.
Cryolite, natural.
Graphite, crystalline fines.
Ilmenite.
Mica muscovite block, stained and lower.
Mica, phlogopite block.
Platinum group metals, osmium.
Platinum group metals, palladium.
Platinum group metals, rhodium.
Platium group metals, ruthenium.
Rutile.
Selenium.
Ziconium ore, baddeleyite.
Zirconium ore, zircon.




Minerals, Materials and Fuels Economic Subcommittee
Interior and Insular Affairs Committee, United States Senate

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*Nonminerals*

| | |
|---|---|
| Agar. | Optical glass. |
| Cotton. | Talc, steatite, ground. |
| Diamond dies. | Wool. |
| Emetine. | |

Senator MALONE. I am glad that all of the different departments are represented here. I am glad that the Forest Service is represented, because that is an important part of your work there in these materials.

By the way, have you ever had occasion to make a map in your department such as I furnished you there? This was prepared by our committee from data supplied by the United States Departments of Commerce and Agriculture. A map such as that shown there brought up to date would be helpful to the committee. If you are prepared to do work of that kind, and I do not know that you are, but at a glance it would show what you considered the 1953 version of the location of these important materials.

Mr. MORSE. That is materials that are coming to the United States?

Senator MALONE. Yes.

Mr. MORSE. And that are in this list of materials?

Senator MALONE. That is right. We have a map from the Bureau of Mines for each mineral to show where each mineral is secured and its present status at a glance can be ascertained. I do not think it is necessary for you to go into all that detail, but on a percentage basis it is very interesting if it could be brought up to date and you have the data.

If you think you could do that I would ask you to do that. I do not want to ask you to do something that would be out of your line.

Mr. MORSE. Mr. Horn, do you have a comment in reference to this?

Mr. HORN. I am sure that we can produce that for you.

Senator MALONE. If you will, then we will make it a part of the Secretary's testimony at this point.

Mr. Morse, before we get into the detail of these materials, there are about 30 to 35 of them, I was going to ask you, following through on the Secretary's testimony, if you are not entirely familiar with any question asked I want to assure you that you will have an opportunity to look up the data later.

Mr. MORSE. Thank you.

Senator MALONE. You will have an opportunity to correct it both for accuracy and completion.

There are certain crops from other nations that become competitive with our own under the system of subsidies that we are using. For example, we are importing butter from the Low Countries, Scandinavian countries, and we are storing quite a considerable amount of butter. Could you give me a list of such crops and production, agricultural production, in this country that are competitive with our own, whether we are now paying subsidies or not, but are competitive

with out own crops under the principle we have adopted for 20 years, 22 years now, of practically free imports, free of tariffs or import fees or, as the Constitution of the United States refers to it, duties, imposts, and excises?

FOREIGN IMPORTS COMPETING WITH PRICE SUPPORT OR SUDSIDIZED DOMESTIC PRODUCTION

Mr. MORSE. We would be glad to furnish such a list. We have moved toward more production in the case of products which have been accumulating. You refer to the dairy products. Because of the support program that we have in this country we have maintained domestic prices above world prices in many instances which tends to pull products here from other nations.

Senator MALONE. What products?

Mr. MORSE. You have referred to dairy products, for example.

Senator MALONE. I would just take in the whole list.

(This data was subsequently furnished and placed in the record at this point at the direction of the chairman.)

COMMODITIES IMPORTED IN COMPETITION WITH DOMESTIC PRODUCTION SUBJECT TO SUBSIDIES AND PRICE SUPPORTS (DAIRY PRODUCTS)

NOTE.—The following table indicates United States imports of supplemental agricultural and related products for the last 2 fiscal years and United States production for 1952, the most comparable year. The list of supplementary commodities includes those which are similar to agricultural commodities produced commercially in the United States and all others that are interchangeable in use to any significant extent with such United States commodities. Items are shown by the import classification categories and units reported by the United States census. United States production of agricultural products are shown for the most comparable categories reported or for the item most nearly corresponding to that listed for imports.

For comparison purposes, some figures for United States production are necessarily duplicated. For example, total United States production of soybeans is shown compared to imports of soybeans as beans and soybean oil and meal produced from these beans are shown in comparison with imports of these commodities. Likewise, both total milk and various dairy products are reported in the column on United States production. United States production is shown only for items appearing on the list of "supplementary imports."

For a number of imported items, domestic production is not regularly reported to the United States Department of Agriculture and no figures for 1952 production are shown and are indicated by the notation n. a.

*Imports for consumption and United States production: Agricultural products*

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| ANIMALS AND ANIMAL PRODUCTS | | | | |
| Animals, live: | | *Thousands* | *Thousands* | |
| Cattle, dutiable (by weight): | | | | |
| Less than 200 pounds, each | Number | 6 | 3 | 35,778 thousand (head). |
| 200 to 700 pounds, each | do | 31 | 184 | |
| 700 pounds or more, each: | | | | |
| Cows for dairy purposes | do | 19 | 14 | |
| Other cattle | do | 46 | 74 | |
| Total cattle, dutiable | do | 102 | 275 | |
| Cattle, free (for breeding) | do | 11 | 10 | |
| Hogs: | | | | |
| For breeding | do | (3) | (3) | 81,506 thousand (head). |
| Other hogs | Pound | 151 | 2,831 | |
| Sheep and lambs: | | | | |
| Sheep for breeding | Number | 2 | 1 | 3,060 thousand (head), sheep. |
| Other sheep and lambs | do | 6 | (3) | 17,319 thousand (head), lambs. |
| Goats: | | | | |
| For breeding | do | (3) | 0 | 1,910,000 head on Texas farms Jan. 1, 1953. |
| Other goats | do | (3) | (3) | |
| Poultry: | | | | |
| Turkeys | Pound | 41 | 47 | 1,008.4 million pounds. |
| Chickens, ducks, geese, and guineas. | do | 2,382 | 793 | 4,446.8 million pounds. |
| Baby chicks of poultry | Number | 145 | 36 | 1,739 million chicks. [4] |
| Horses: | | | | |
| For breeding | do | (3) | (3) | 3,798,000 head on farms Jan. 1, 1953. |
| Other horses | do | 2 | 3 | |
| Horses and mules for immediate slaughter. | do | 16 | 19 | |
| Asses and burros: | | | | |
| For breeding | do | 0 | (3) | 1,753,000 head on farms Jan. 1, 1953. |
| Other asses and burros | do | (3) | 1 | |
| Mules | do | 0 | (3) | |
| Foxes, silver or black | do | (3) | 0 | N. a. |
| Other animals for breeding, except dogs and birds. | do | (3) | (3) | |
| Dairy products: | | | | |
| Butter | Pound | 216 | 301 | 1,417 million pounds (all). |
| Casein or lactarene | do | 41,177 | 71,685 | 7.5 million pounds. |
| Cheese: | | | | |
| Swiss: | | | | |
| Emmenthaler with eye formation. | do | 6,540 | 9,457 | 108.4 million pounds. |
| Gruyere process-cheese | do | 1,413 | 3,953 | |
| Total swiss cheese | do | 7,953 | 13,410 | |
| Other cheese: | | | | |
| Blue-mold, original loaves | do | 3,355 | 3,669 | 10.9 million pounds. |
| Bryndza | do | 2 | 0 | None. |
| Cheddar | do | 7,893 | 10,737 | 549.8 million pounds. |
| Edam and gouda, containing 40 percent or more butterfat. | do | 2,877 | 4,350 | 4.2 million pounds. |
| Other | do | 44 | 45 | |
| Goya, original loaves | do | 0 | 0 | |
| Provoloni, original loaves | do | 3,636 | 3,500 | 60.9 million pounds (all Italian varieties). |
| Provolette, original loaves | do | 82 | 64 | |
| Reggiano, original loaves | do | 727 | 1,482 | |
| Parmesano, original loaves | do | 68 | 193 | |
| Romano, original loaves, made from cow's milk. | do | 787 | 2,340 | |
| Pecorino, original loaves: | | | | |
| Not suitable for grating | do | 147 | 387 | Little or no United States production. |
| Made from sheep's milk and suitable for grating. | do | 11,077 | 10,867 | |
| Roquefort, original loaves | do | 1,368 | 2,013 | |
| Sbrinz, original loaves | do | 295 | 463 | |
| Other cheese | do | 3,617 | 5,548 | |
| Total, other than swiss | do | 35,975 | 45,658 | 1,062 million pounds. |
| Total cheese | do | 43,928 | 59,068 | 1,170.4 million pounds. |

See footnotes at end of table.

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| ANIMALS AND ANIMAL PRODUCTS—con. | | *Thousands* | *Thousands* | |
| Milk and cream: | | | | |
| Whole milk | Gallon | 1 | (3) | Total United States milk production was 115.2 billion pounds. |
| Skimmed milk and buttermilk | do | 7 | (3) | |
| Cream | do | 1 | (3) | |
| Condensed and evaporated: | | | | |
| In airtight containers: | | | | |
| Sweetened | Pound | (3) | 4 | 54.4 million pounds. |
| Unsweetened | do | 3 | 415 | |
| All other condensed and evaporated | do | 0 | 10 | 216.9 million pounds. |
| Total condensed and evaporated | do | 3 | 429 | 3,990.4 million pounds. |
| Dried milk, malted, etc.: | | | | |
| Whole | do | 18,565 | 30,394 | 101.7 million pounds. |
| Skimmed | do | 861 | 126 | 888.7 million pounds. |
| Buttermilk | do | 5,852 | 9,260 | 47.1 million pounds. |
| Cream | do | 72 | 290 | 0.9 million pounds. |
| Malted milk, etc. | do | 3,002 | 2,614 | 29.3 million pounds. |
| Total dried, malted, etc. | do | 28,352 | 42,684 | 1,075.1 million pounds. |
| Total dairy products [4] | | | | |
| Eggs and egg products: | | | | |
| Eggs in the shell: | | | | |
| Chicken eggs | Dozen | 5,417 | 4,854 | 5,593 million dozen. |
| Other eggs | do | 199 | 56 | |
| Egg products: | | | | |
| Eggs, whole, dried | Pound | (3) | 0 | 2.7 million pounds. |
| Egg yolks, dried | do | 100 | 0 | 8.1 million pounds. |
| Egg albumen, dried | do | 67 | 436 | 6.6 million pounds. |
| Eggs, whole, frozen, etc. | do | 13 | 19 | 148.7 million pounds. |
| Egg yolks, frozen, etc. | do | 0 | 0 | 68.8 million pounds. |
| Egg albumen, frozen, etc. | do | 0 | 0 | 102.9 million pounds. |
| Hides and skins, raw (except furs): | | | | |
| Buffalo hides: | | | | |
| India water buffalo | do | 1,361 | 848 | Negligible. |
| Other buffalo | do | 2,006 | 1,364 | Do. |
| Calfskins: | | | | |
| Dry or dry salted | do | 923 | 748 | 115.8 million pounds (estimated). |
| Wet salted | do | 6,408 | 11,780 | |
| Cattle hides: | | | | |
| Dry or dry salted | do | 8,729 | 2,320 | 978.1 million pounds (estimated). |
| Wet salted | do | 70,547 | 19,171 | |
| Deer and elkskins | do | 2,399 | 2,364 | N. a. |
| Goat and kid skins: | | | | |
| Dry or dry salted | do | 35,386 | 47,551 | 0.1 million pounds (estimated). |
| Green or pickled | do | 3,138 | 2,989 | |
| Hair sheep and cabretta skins | do | 4,537 | 5,647 | N. a. |
| Horse, colt, and ass hides: | | | | |
| Dry or dry salted | do | 505 | 1,171 | 25 million pounds (estimated). |
| Wet salted | do | 13,782 | 13,326 | |
| Kangaroo and wallaby skins | do | 1,131 | 635 | None. |
| Kip skins: | | | | |
| Dry or dry salted | do | 1,459 | 900 | Do. |
| Wet salted | do | 2,697 | 4,402 | Do. |
| Sheep and lamb skins: | | | | |
| Pickled skins, fleshers, etc. | do | 46,790 | 47,457 | 69 million pounds (estimated). |
| Wooled, dry and green salted | do | 6,869 | 8,120 | |
| Other hides and skins, agricultural | Piece | 3,120 | 4,317 | |
| Total hides and skins [4] | Pound | 208,667 | 170,793 | |
| Honey | do | 8,605 | 10,042 | 272 million pounds. |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| ANIMALS AND ANIMAL PRODUCTS—con. | | | | |
| Meats and meat products: | | *Thousands* | *Thousands* | |
| Beef, fresh, frozen, etc. | Pound | 51,692 | 70,025 | Breakdown not available. |
| Veal, fresh, frozen, etc. | do | 3,523 | 313 | Do. |
| Beef and veal, pickled or cured | do | 94,526 | 14,312 | Do. |
| Beef, canned, including corned | do | 121,960 | 124,691 | Do. |
| Total beef and veal | do | 271,701 | 209,341 | 9,667 million pounds. |
| Mutton and lamb: | | | | |
| Mutton, fresh, frozen, etc. | do | 62 | 1,297 | 648 million pounds. |
| Lamb, fresh, frozen, etc. | do | 8,284 | 2,952 | |
| Total mutton and lamb | do | 8,346 | 4,249 | |
| Pork: | | | | |
| Fresh, chilled or frozen | do | 10,144 | 19,699 | Comparable breakdown not available. |
| Hams, shoulders and bacon: | | | | |
| Not cooked, boned or made into sausage | do | 2,297 | 3,511 | |
| Other (including canned hams) | do | 30,339 | 80,455 | |
| Pickled or salted pork: | | | | |
| Not cooked, boned, canned or made into sausage | do | 185 | 377 | |
| Other | do | 654 | 1,489 | |
| Sausage: | | | | |
| Made from hams, shoulders, and bacon | do | 65 | 146 | |
| Made from pickled or salted pork | do | 608 | 524 | |
| Total pork | do | 53,292 | 106,201 | 11,547 million pounds. |
| Poultry, including birds: | | | | |
| Dead, dressed or undressed: | | | | |
| Turkeys | do | 1 | 1 | 762 million pounds. |
| Other poultry | do | 187 | 37 | 3,637 million pounds (fresh weight). |
| Prepared or preserved | do | 360 | 156 | |
| Total poultry | do | 548 | 194 | 4,399 million pounds. |
| Other meats: | | | | |
| Fresh, chilled, or frozen | do | 6,751 | 4,638 | Included above or not available. |
| Meat paste, prepared or preserved. | do | 8 | 5 | |
| Other meats, canned, prepared or preserved (including liver paste). [7] | do | 13,415 | 50,334 | |
| Total meats | do | 354,061 | 374,962 | |
| Meat extract, including fluid | do | 3,420 | 3,894 | N. a. |
| Sausage casings: | | | | |
| Sheep, lamb, and goat | do | 6,565 | 4,553 | |
| Other sausage casings | do | 8,256 | 7,116 | |
| Total sausage casings | do | 14,821 | 11,669 | |
| Oils and fats, animal: | | | | |
| Lard | do | 2,287 | 4,512 | 2,886 million pounds. |
| Lard compounds and substitutes | do | 7 | 0 | |
| Oleo oil | do | 0 | 0 | 45.5 million pounds. |
| Oleo stearin | do | 82 | 83 | 23.9 million pounds. |
| Oleomargarine, etc. | do | 191 | 210 | 1,286 million pounds. |
| Stearic acid | do | 166 | 104 | Included in other products. |
| Tallow: | | | | |
| Edible | do | 187 | 6 | 102.5 million pounds. |
| Inedible | do | 1,078 | 121 | 2,313.9 million pounds. |
| Total tallow | | 1,265 | 127 | 2,416.4 million pounds. |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| ANIMALS AND ANIMAL PRODUCTS—con. | | *Thousands* | *Thousands* | |
| **Oils and fats, animal—Continued** | | | | |
| Neat's-foot oil and stock | Gallon | 33 | 47 | 1.8 million pounds. |
| Wool grease | Pound | 3,931 | 9,773 | 8.5 million pounds. |
| Other oils and fats, edible | do | (3) | 6 | Negligible. |
| Other fats, greases and oils, inedible | do | 588 | 90 | |
| Other animal oils, inedible | Gallon | 53 | 0 | |
| Wool and mohair, unmanufactured (except free in bond), actual weight: | | | | |
| Donskoi, Smyrna, etc., without merino or English blood: | | | | |
| In the grease | Pound | 1,563 | 2,906 | Total shorn wool, 232.4 million pounds; pulled wool, 33.6 million pounds; total, 266 million pounds. |
| Washed, scoured, etc | do | 972 | 2,134 | |
| Other not finer than 40's: | | | | |
| Woolen type: | | | | |
| In the grease | do | 6,350 | 9,100 | |
| Washed, scoured, etc | do | 453 | 1,686 | |
| Worsted type: | | | | |
| In the grease | do | 11,790 | 23,036 | |
| Washed, scoured, etc | do | 1,105 | 2,042 | |
| Hair of the camel: | | | | |
| In the grease | do | 26 | 199 | |
| Washed, scoured, etc | do | 77 | 313 | |
| Total Donskoi, Smyrna, etc | | 22,336 | 41,416 | |
| Other wools: | | | | |
| Woolen type (clothing wool): | | | | |
| 40's to 44's: | | | | |
| In the grease | Pound | 1,790 | 3,570 | |
| Washed, scoured, etc | do | 627 | 780 | |
| 44's to 56's: | | | | |
| In the grease | do | 6,461 | 9,292 | |
| Washed, scoured, etc | do | 5,260 | 6,754 | |
| Finer than 56's: | | | | |
| In the grease | do | 9,207 | 9,576 | |
| Washed, scoured, etc | do | 12,085 | 12,184 | |
| Total woolen type | do | 35,430 | 42,156 | |
| Worsted type (combing wool): | | | | *Units* |
| 40's to 44's: | | | | |
| In the grease | do | 9,676 | 14,052 | See summary above. |
| Washed, scoured, etc | do | 1,567 | 1,510 | |
| 44's to 56's: | | | | |
| In the grease | do | 34,624 | 35,133 | |
| Washed, scoured, etc | do | 7,426 | 7,461 | |
| Finer than 56's: | | | | |
| In the grease | do | 212,627 | 201,124 | |
| Washed, scoured, etc | do | 24,545 | 19,019 | |
| Total worsted type | do | 290,465 | 278,299 | |
| Hair of the Angora goat (mohair): | | | | |
| In the grease | do | 1,723 | 1,341 | 12.1 million pounds. |
| Washed, scoured, etc | do | 611 | 363 | |
| Hair of the alpaca, llama and vicuna: | | | | |
| In the grease | do | 825 | 567 | Little or no United States production. |
| Washed, scoured, etc | do | 3,183 | 4,027 | |
| Hair of the Cashmere goat: | | | | |
| In the grease | do | 650 | 286 | |
| Washed, scoured, etc | do | 1,312 | 2,901 | |
| Hair of Angora rabbit, etc.: | | | | |
| In the grease | do | 0 | 5 | |
| Washed, scoured, etc | do | 75 | 246 | |
| Wool, carbonized | do | 1,029 | 357 | |
| Total wool, unmanufactured (except free in bond), actual weight | do | 357,639 | 371,964 | |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| ANIMALS AND ANIMAL PRODUCTS—con. | | | | |
| Miscellaneous animal products: | | *Thousands* | *Thousands* | *Units* |
| Animal hair, unmanufactured: | | | | |
| Body hair, except ear hair | Pound | 2,162 | 5,278 | N. a. |
| Horse mane and tail hair | do | 2,537 | 4,565 | |
| Other animal hair, unmanufactured | do | 11,912 | 9,314 | |
| Beeswax, crude | do | 4,530 | 4,705 | 4,825 thousand pounds. |
| Other animal wax | do | 178 | 118 | N. a. |
| Blood, dried (2,000 pounds) | Ton | 4 | 50 | |
| Blood albumen, dried | Pound | 16 | 37 | |
| Bones, hoofs, and horns unmanufactured (2,240 pounds) | Ton | 125 | 67 | |
| Bristles: | | | | |
| Crude, not sorted, etc | Pound | 21 | 4 | |
| Sorted, bunched, or prepared | do | 5,158 | 2,952 | |
| Feathers, crude | do | 12,843 | 5,688 | |
| Gelatin, edible | do | 1,017 | 1,859 | |
| Gelatin, inedible | do | 323 | 4,627 | |
| Glue and glue size | do | 2,823 | 10,601 | N. a. |
| Glue stock, hide cuttings, etc | do | 37,741 | 25,091 | |
| Manures, animal (2,000 pounds) | Ton | [3] | [3] | |
| Tankage (2,000 pounds): | | | | |
| For fertilizer | do | 3 | 3 | 1,000 th. tons. |
| Other tankage | do | 31 | 25 | |
| Other miscellaneous animal products. [4] | | [5] | [5] | N. a. |
| VEGETABLE PRODUCTS | | | | |
| Coffee imported into Puerto Rico | Pound | 1,855 | 4,255 | None. |
| Cotton and other vegetable fibers, unmanufactured: | | | | |
| Cotton (480 pounds): | | | | |
| Staple under 1⅛ inches | Bale | 35 | 69 | 14,529 thousand bales. |
| Staple 1⅛ inches and over | do | 45 | 130 | 424 thousand bales. |
| Total cotton | do | 80 | 199 | 14,953 thousand bales. |
| Linters (480 pounds) | do | 92 | 334 | 2,069 thousand bales. |
| Total cotton and linters | do | 172 | 533 | 17,022 thousand bales. |
| Flax (2,240 pounds): | | | | |
| Hackled | Ton | [3] | [3] | Negligible |
| Other | do | 3 | 3 | |
| Hemp (2,240 pounds) | do | [3] | 1 | |
| Jute and jute butts (2,240 pounds): | | | | |
| Jute | do | 23 | 66 | |
| Jute butts | do | 5 | 27 | |
| Drugs, herbs, etc.: | | | | |
| Belladonna | Pound | 37 | 9 | N. a. |
| Ginseng | do | [3] | [3] | |
| Stramonium | do | 198 | 108 | |
| Fruits and preparations: | | | | |
| Apples: | | | | |
| Green or ripe (50 pounds) | Bushel | 1,018 | 1,827 | 92.5 million (bushels). |
| Dried, desiccated or evaporated | Pound | [3] | [3] | Included above. |
| Otherwise prepared or preserved | do | 133 | 3,346 | Do. |
| Avocados | do | 9,171 | 6,921 | 64 million (pounds). |
| Berries, natural or in brine: | | | | |
| Blueberries | do | 19,360 | 15,068 | N. a. |
| Strawberries | do | 4,380 | 5,534 | 12.4 million (crates). |
| Loganberries | do | 1 | 0 | N. a. |
| Lingon or partridge berries | do | 412 | 262 | |
| Raspberries | do | 3,859 | 4,532 | |
| Other berries | do | 96 | 72 | |
| Berries, frozen: | | | | |
| Blueberries | do | 4,633 | 4,738 | |
| Other berries | do | 7,005 | 6,440 | |
| Berries, otherwise prepared or preserved: | | | | |
| Blueberries | do | 1 | 29 | |
| Other berries | do | 532 | 1,100 | |

See footnotes at end of table.

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| VEGETABLE PRODUCTS—continued | | | | |
| Fruits and preparations—Continued | | *Thousands* | *Thousands* | *Units* |
| Cherries: | | | | |
| Natural state | Pound | 1,600 | 824 | 435.9 million pounds, all cherries. |
| Sulfured or in brine | do | 6,703 | 3,359 | |
| Dried, prepared, or preserved | do | 1,313 | 966 | |
| Citrons or citron peel: | | | | |
| Candied or prepared | do | (3) | 13 | N. a. |
| Dried or in brine | do | 34 | 58 | |
| Currants | do | 135 | 151 | |
| Dates: | | | | |
| Fresh or dried: | | | | |
| With pits | do | 265 | 3,138 | 33 million pounds, fresh weight. |
| With pits removed | do | 40,121 | 33,270 | |
| Packed in units of not more than 10 pounds. | do | 1 | 15 | |
| Jujubes (Chinese dates) prepared or preserved. | do | (3) | (3) | |
| Other, prepared or preserved | do | 1,255 | 1,554 | |
| Figs: | | | | |
| Fresh, dried, or in brine | do | 7,094 | 4,314 | 30 million pounds (fresh). |
| Fig paste | do | 2,171 | 1,138 | 56.2 million pounds (dried). |
| Prepared or preserved | do | 317 | 504 | |
| Grapefruit and pomeloes | do | 6,871 | 7,433 | 38.4 million boxes for all uses. |
| Grapes—(40 lb.): | | | | |
| Hothouse | Cubic feet | (3) | (3) | 3.2 million tons. |
| Other | do | 821 | 979 | |
| Lemons | Pound | 128 | 161 | 12.6 million boxes. |
| Limes | do | 5,241 | 7,906 | 320 thousand boxes. |
| Melons: | | | | |
| Cantaloupes | do | 6,644 | 13,266 | 478 thousand tons. |
| Watermelons | do | 6,822 | 12,473 | 1,227 thousand tons. |
| Other melons | do | 6,825 | 8,426 | N. a. |
| Olives in brine: | | | | |
| Green or ripe | Gallon | 3,696 | 4,434 | 57 thousand tons, fresh basis. |
| Pitted or stuffed | Pound | 7,333 | 11,251 | |
| Olives, dried, ripe, etc | do | 161 | 288 | |
| Oranges: | | | | |
| Fresh | do | 8,894 | 19,926 | 125 million boxes for all uses. |
| Mandarin oranges, canned | do | 1,433 | 7,130 | |
| | | | | *Units, fresh basis* |
| Peaches, green, ripe, in brine | do | 2,952 | 1,677 | 62.6 million bushels. |
| Pears, green ripe, in brine | do | 17,101 | 12,684 | 30.9 million bushels. |
| Pineapples: | | | | |
| Natural state: | | | | |
| In crates of 2.45 cubic feet | Crate | 540 | 569 | 19,000 crates (Florida only). |
| In bulk | Number | 11,729 | 12,061 | |
| Candied, prepared, or preserved | Pound | 80,958 | 111,768 | |
| Prunes and plums: | | | | |
| Green, ripe, or in brine | do | 2,581 | 1,709 | 146.6 thousand tons. |
| Dried or evaporated | do | 2 | 11 | 135 thousand tons. |
| Otherwise prepared or preserved | do | 729 | 449 | |
| Raisins: | | | | |
| Made from seedless grapes | do | 18 | 48 | 290,000 tons included in grapes. |
| Other | do | 4 | 52 | |
| Other dried grapes | do | 0 | 0 | |
| Tamarinds | | (5) | (5) | None. |
| Fruit juices: | | | | |
| Apple cider | Gallon | 126 | 304 | Included in fruit production. |
| Cherry and prune juice | do | 2,464 | 9,116 | |
| Citrus fruit juices, concentrated | do | 608 | 1,265 | |
| Citrus fruit juices, unconcentrated. | do | 140 | 181 | |
| Fruit peel, crude, candied, etc.: | | | | |
| Grapefruit | Pound | 11 | 0 | N. a. |
| Lemon | do | 336 | 1,723 | |
| Orange | do | 447 | 1,711 | |
| Other | do | 2 | 3 | |
| Jellies, jams, etc | do | 5,751 | 8,370 | |
| Other fruits, natural, dried, or prepared. | | (5) | (5) | |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| VEGETABLE PRODUCTS—continued | | | | |
| Wines and other beverages: | | *Thousands* | *Thousands* | *Units, fresh basis* |
| Champagne and other sparkling | Gallon | 598 | 568 | 1.3 million gallons.[16] |
| Still wines | do | 4,498 | 5,066 | 130.3 million gallons.[16] |
| Malt liquors | do | 3,626 | 4,139 | 2,802.4 million gallons.[16] |
| Other beverages and fruit juices | | (3) | (3) | N. a. |
| Grains and grain products:[3] | | | | |
| Barley (48 pounds) | Bushel | 11,045 | 23,163 | 226 million bushels. |
| Barley malt | Pound | 61,820 | 58,834 | |
| Buckwheat | do | 1,129 | 2,980 | 3.2 million bushels. |
| Buckwheat flour, grits, groats | do | 4 | 2 | |
| Corn and cornmeal: | | | | |
| Corn grain (56 pounds) | Bushel | 856 | 953 | 3,297.4 million bushels. |
| Cornmeal, flour, grits, etc | Cwt | (3) | 1 | |
| Corn, including cornmeal in terms of grain. | Bushel | 856 | 955 | |
| Oats and oatmeal: | | | | |
| Oats (32 pounds) | do | 61,688 | 67,707 | 1,260.1 million bushels. |
| Oats, unhulled, ground | do | 567 | 850 | |
| Oatmeal, rolled oats, etc | Cwt | 2 | 5 | |
| Oats, including oatmeal in terms of grain. | Bushel | 62,271 | 68,593 | |
| Rice: | | | | |
| Uncleaned or brown | Pound | 0 | 2 | 48.1 million hundredweight. |
| Cleaned or milled | do | 1,005 | 5 | |
| Meal, flour, polish, and bran | do | 3 | 35 | |
| Broken rice | do | 48,998 | 21,759 | |
| Rye and rye flour: | | | | |
| Rye (56 pounds) | Bushel | 1,342 | 5,564 | 16 million bushels. |
| Rye flour and meal | Cwt | (3) | 0 | |
| Wheat and wheat flour: | | | | |
| Wheat grain (60 pounds): | | | | |
| For domestic use: | | | | |
| Unfit for human consumption | Bushel | 29,920 | 20,384 | 1,299 million bushels. |
| Other (full duty wheat) | do | 1,476 | 1,016 | |
| Total wheat grain | do | 31,396 | 21,400 | |
| Wheat flour (100 pounds): For domestic use. | Bags | 47 | 50 | Included in wheat as grain. |
| Other grain products: | | | | |
| Bread, yeast-leavened | Pound | 1,829 | 2,045 | Included in grain. |
| Macaroni, vermicelli, etc | do | 1,805 | 2,229 | |
| Feeds and fodders: | | | | |
| Beet pulp, dried (2,000 pounds) | Ton | 69 | 72 | 320,000 tons. |
| Bran, shorts, etc., of wheat: | | | | |
| Of direct import (2,000 pounds) | do | 299 | 299 | 4,456,000 tons. |
| Withdrawn bonded mills (2,000 pounds). | do | 43 | 54 | |
| Byproduct feeds, excluding wheat (pounds). | do | 13 | 13 | N. a. |
| Grain hulls | Pound | 46,195 | 37,109 | |
| Hay (2,000 pounds) | Ton | 59 | 105 | 104,345,000 tons. |
| Malt sprouts and brewers' grains (2,000 pounds). | do | 29 | 38 | 229,000 tons. |
| Mixed feeds (2,000 pounds) | do | 12 | 18 | 34,400,000 tons. |
| Oil cake and oil-cake meal: | | | | |
| Coconut or copra | Pound | 151,151 | 236,373 | 232 million pounds. |
| Cottonseed | do | 246,785 | 414,987 | 5,346 million pounds. |
| Linseed | do | 9,340 | 88,778 | 916 million pounds. |
| Peanut | do | 3,810 | 13,896 | 84 million pounds. |
| Soybean | do | 30,575 | 104,304 | 11,102 million pounds. |
| Other oil cake and meal | do | 25,077 | 114,233 | N. a. |
| Total oil cake and meal | do | 466,738 | 972,571 | 17,680 million pounds. |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| VEGETABLE PRODUCTS—continued | | | | |
| Feeds and fodders—Continued | | *Thousands* | *Thousands* | *Units, resh basis* |
| Screenings, scalpings, etc.: | | | | |
| Of flaxseed | Pound | 30,395 | 34,757 | Comparable data not available. |
| Other screenings (2,000 pounds) | Ton | 241 | 299 | |
| Straw (2,000 pounds) | do | 15 | 2 | |
| Dog food (excluding biscuit) | Pound | 3,594 | 5,699 | |
| Hops | do | 3,743 | 3,368 | 61.3 million pounds. |
| Nursery and greenhouse stock: | | | | |
| Bulbs, roots, and corms: | | | | |
| Hyacinth bulbs | Number | 23,515 | 24,811 | Comparable data not available for 1952. |
| Lily bulbs | do | 6,064 | 6,657 | |
| Lily-of-the-valley pips | do | 3,202 | 2,013 | |
| Narcissus bulbs | do | 24,675 | 28,264 | |
| Tulip bulbs | do | 139,252 | 165,604 | |
| Crocus corms and other bulbs | do | 269,077 | 381,723 | |
| Flowers cut, fresh, dried, etc.: orchids, cut | do | 87 | 132 | |
| Trees, plants, cuttings, etc.: | | | | |
| Fruit stocks, seedlings, etc | do | 38 | 74 | |
| Orchid plants | do | 64 | 91 | |
| Rose stocks and plants, etc | do | 2,174 | 1,896 | |
| Other trees, plants, etc | do | 3,578 | 2,468 | |
| Nuts and preparations: | | | | |
| Almonds: shelled | Pound | 3,636 | 6,763 | 72 million pounds. |
| Brazil or cream nuts: | | | | |
| Shelled | do | 6,382 | 5,672 | Little or no United States production. |
| Not shelled | do | 21,056 | 19,490 | |
| Cashew nuts | do | 41,273 | 44,978 | |
| Chestnuts, including marrons | do | 15,667 | 18,328 | |
| Coconuts, in the shell | Number | 12,686 | 9,135 | |
| Coconut meat, desiccated, etc | Pound | 82,790 | 98,776 | |
| Filberts: | | | | |
| Shelled | do | 6,978 | 5,207 | 24.5 million pounds. |
| Not shelled | do | 184 | 165 | 1,372 million pounds. |
| Peanuts: Shelled | do | 0 | 0 | 148 million pounds. |
| Pecans: Shelled | do | 375 | 217 | |
| Pignolia: | | | | |
| Shelled | do | 239 | 282 | Little or no United States production. |
| Not shelled | do | 25 | 25 | |
| Pistache: | | | | |
| Shelled | do | 771 | 311 | |
| Not shelled | do | 7,312 | 5,866 | |
| Walnuts: | | | | |
| Shelled | do | 6,857 | 6,703 | 168 million pounds. |
| Not shelled | do | 15 | 106 | |
| Other edible nuts | do | 105 | 47 | N. a. |
| Other nuts and nut preparations | do | 619 | 578 | N. a. |
| Oilseeds: | | | | *Million units* |
| Apricot and peach kernels | do | 10 | 10 | No United States production. |
| Babassu kernels | do | 661 | 0 | |
| Castor beans | do | 128,483 | 127,406 | 34 (pounds). |
| Copra | do | 749,077 | 649,201 | No United States production. |
| Flaxseed (56 pound) | Bushel | [3] | [3] | 30.2 (bushel). |
| Hempseed | Pound | 299 | 286 | |
| Palm nuts and palm-nut kernels: | | | | |
| Nuts | do | 19 | 32 | Little or no United States production. |
| Kernels | do | 1 | 10 | |
| Perilla seed | do | 0 | 0 | |
| Poppy seed | do | 5,715 | 7,563 | |
| Rapeseed | do | 2,783 | 4,829 | |
| Sesame seed | do | 8,918 | 13,132 | |
| Soybeans | do | 36 | 144 | 262.3 million bushels. |
| Sunflower seed | do | 1,273 | 1,309 | N. a. |
| Tucum kernels | do | 5,721 | 0 | No United States production. |
| Tung nuts | do | 0 | 1,468 | 264.2 million pounds. |
| Other oilseeds | do | 411 | 1,307 | N. a. |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| VEGETABLE PRODUCTS—continued | | | | |
| Oils, fats, and waxes, vegetable: | | *Thousands* | *Thousands* | *Million units* |
| Expressed or extracted: | | | | |
| Babassu-nut oil | Pound | 11,171 | 0 | No United States production. |
| Cacao butter | do | 706 | 3,208 | |
| Carnauba wax | do | 14,294 | 12,359 | See castor beans. |
| Castor oil | do | 89,705 | 135,184 | No United States production. |
| Coconut oil | do | 79,144 | 143,585 | |
| Corn or maize oil, edible | do | 39 | 0 | 232 million pounds. |
| Cottonseed oil | do | (3) | (3) | 3,248 million pounds. |
| Linseed oil | do | 40 | 3 | 797 million pounds. |
| Oiticica oil | do | 7,099 | 9,046 | No United States production. |
| Olive oil, edible: | | | | Units |
| In packages weighing less than 40 pounds each | do | 7,801 | 16,726 | 4.4 million pounds. |
| Other olive oil, edible | do | 21,782 | 31,921 | |
| Olive oil, inedible: | | | | |
| Sulfured or foots | do | 0 | 2,206 | |
| Other olive oil, inedible | do | 248 | 150 | |
| Palm oil | do | 105,047 | 33,196 | No United States production. |
| Palm-kernel oil: | | | | |
| Edible | do | 5,030 | 18,260 | |
| Inedible | do | 0 | 22,718 | |
| Peanut oil (crude and refined) | do | 0 | (3) | 191 million pounds. |
| Rapeseed oil: | | | | |
| For mechanical use | do | 3,600 | 4,956 | Little or no United States production. |
| Other rapeseed oil | do | 419 | 61 | |
| Sesame oil: Edible | do | 92 | 48 | 4,653 million pounds. |
| Soybean oil (crude and refined) | do | 1 | (3) | Little United States production. |
| Sunflower oil, edible | do | 1 | (3) | |
| Tung oil | do | 24,093 | 19,954 | 23.2 million pounds. |
| Vegetable wax (excluding carnauba): | | | | |
| Japan | do | 66 | 210 | Little or no United States production. |
| Candelilla | do | 4,354 | 8,639 | |
| Ouricury (uricury) | do | 2,495 | 4,344 | |
| Other | do | 2,174 | 2,900 | |
| Other oils and fats, expressed: | | | | |
| Edible | do | (3) | 7 | |
| Inedible | do | 4,045 | 4,698 | |
| Essential or distilled: | | | | |
| Eucalyptus oil | do | 348 | 415 | N. a. |
| Lemon oil (including terpeneless) | do | 131 | 97 | N. a. |
| Orange oil (including terpeneless) | do | 42 | 52 | 1.8 million pounds. |
| Peppermint oil | do | 9 | (3) | |
| Seeds, field and garden: | | | | |
| Alfalfa | do | 5,887 | 8,670 | 180.3 million pounds. |
| Canary | do | 15,048 | 21,799 | N. a. |
| Clover: | | | | |
| Alsike | do | 136 | 4,014 | 13.2 million pounds. |
| Crimson | do | 14,979 | 7,620 | 28.3 million pounds. |
| Red | do | 5,582 | 4,807 | 98.7 million pounds. |
| Sweet | do | 13,404 | 16,278 | 43.8 million pounds. |
| White and ladino | do | 1,773 | 2,861 | 17.8 million pounds. |
| Other clover seed | do | 1,911 | 862 | |
| Bromegrass | do | 6,497 | 12,918 | 7.2 million pounds. |
| Millet | do | 2,170 | 12,330 | N. a. |
| Other grass | do | 25,836 | 27,532 | |
| Vetch | do | 260 | 4,818 | 19,690 thousand pounds. |
| Vegetable seeds: | | | | |
| Cabbage | do | 95 | 65 | 453 thousand pounds. |
| Onion | do | 40 | 47 | 317 thousand pounds. |
| Spinach | do | 1,922 | 1,793 | 176 thousand pounds. |
| Turnip | do | 229 | 96 | 2,590 thousand pounds. |
| Other garden and field seeds | do | 2,239 | 2,655 | N. a. |

**See footnotes at end of table.**

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| VEGETABLE PRODUCTS—continued | | | | |
| Spices: | | | | |
| Capsicum or red or cayenne peppers, including chili: | | *Thousands* | *Thousands* | *Units* |
| Ground | Pound | 39 | 90 | |
| Unground | do | 4,101 | 7,190 | |
| Celery seeds | do | 1,095 | 1,879 | |
| Mustard: | | | | |
| Ground or pepared | do | 1,133 | 677 | Little or no United States production. |
| Whole seeds | do | 30,736 | 27,154 | |
| Onion powder | do | 71 | 45 | |
| Paprika, ground or unground | do | 6,918 | 9,805 | |
| Total spices (supplementary) | | 44,093 | 46,840 | |
| Starch: | | | | |
| Cornstarch | do | 43 | 896 | |
| Potato starch | do | 9,294 | 51,310 | Included in United Stated crop production. |
| Other starch | do | 171 | 223 | |
| Total starch | | 9,508 | 52,429 | |
| Sugar, molasses, and sirups: | | | | |
| Beet sugar (2,000 pounds) | Ton | 0 | [3] | 10.2 million units (tons). |
| Cane sugar (2,000 pounds) | do | 3,827 | 3,813 | 7.6 million units (tons). |
| Dextrose | Pound | 2 | 140 | N. a. |
| Lactose | do | 1,968 | 3,314 | N. a. |
| Maple sirup | do | 4,453 | 5,427 | 18.2 million units (pounds). |
| Maple sugar | do | 6,963 | 8,685 | 0.2 million units. |
| Tobacco, unmanufactured: | | | | |
| Leaf: | | | | |
| Cigar leaf (filler): | | | | |
| Stemmed | do | 11,756 | 10,871 | |
| Unstemmed | do | 4,734 | 4,455 | |
| Cigarette leaf, unstemmed: | | | | |
| Smoke-cured, Latakia type | do | 4,498 | 3,777 | |
| Other cigarette leaf | do | 76,013 | 74,179 | |
| Leaf for cigar wrappers: Unstemmed | do | 1,164 | 919 | |
| Total leaf tobacco | | 98,165 | 94,201 | 2,254.5 million pounds. |
| Scrap tobacco | do | 7,082 | 11,220 | |
| Stems, not cut, etc | do | 378 | 506 | |
| Total tobacco, unmanufactured | | 105,625 | 105,927 | |
| Vegetables and preparations: | | | | |
| Fresh and dried: | | | | |
| Asparagus | do | [3] | [3] | 308 million pounds. |
| Beans: | | | | |
| Green or unripe: | | | | |
| Limas | do | [3] | 275 | 1,209.6 million pounds. |
| Other green or unripe | do | 1,107 | 1,622 | |
| In brine | do | 13 | 16 | |
| Dried: | | | | |
| Red kidney beans | do | 22 | 167 | 237.7 million pounds. |
| Other dried beans | do | 12,404 | 16,536 | |
| Beets, other than sugar | do | 261 | 847 | 322.4 million pounds. |
| Cabbage | do | 16,636 | 5,205 | 2,512.8 million pounds. |
| Cauliflower | do | 455 | 794 | 472.6 million pounds. |
| Carrots | do | 6,214 | 4,506 | 1,551.8 million pounds. |
| Celery | do | 665 | 1,442 | 1,426 million pounds. |
| Chickpeas or garbanzos: | | | | |
| Dried | do | 9,773 | 9,931 | 4.4 million pounds. |
| Green or unripe | do | 33 | 0 | |
| Cowpeas: | | | | |
| Blackeye, green or unripe | do | 19 | 5 | 64.7 million pounds. |
| Blackeye, dried or in brine | do | 609 | 7,166 | |
| Other cowpeas | do | 2 | 315 | |
| Cucumbers | do | 16,992 | 21,111 | 1,021 million pounds. |
| Dasheen | do | 607 | 538 | N. a. |
| Eggplant | do | 3,072 | 1,874 | 54.4 million pounds. |

See footnotes at end of table.

*Imports for consumption and United States production: Agricultural products*—Continued

| Commodity imported—supplementary | Unit | Year beginning July 1 [1]—quantity | | United States production, 1952 [2] |
|---|---|---|---|---|
| | | 1951–52 | 1952–53 | |
| VEGETABLE PRODUCTS—continued | | | | |
| Vegetables and preparations—Continued | | *Thousands* | *Thousands* | *Units* |
| Fresh and dried—Continued | | | | |
| Endives as crude chicory | Pound | 1,259 | 1,414 | N. a. |
| Garlic | do | 14,417 | 20,122 | 12.4 million pounds. |
| Horseradish | do | [3] | 300 | N. a. |
| Lentils | do | 4,611 | 3,460 | |
| Lettuce | do | 11,943 | 9,488 | 2,794 million pounds. |
| Lupines | do | 538 | 699 | N. a. |
| Mushrooms | do | 349 | 429 | |
| Okra | do | 1,105 | 1,648 | |
| Onions | do | 31,331 | 37,982 | 1,990 million pounds. |
| Peas: | | | | |
| Green or unripe | do | 5,624 | 6,644 | 920.6 million pounds. |
| Dried | do | 1,973 | 6,190 | 237.7 million pounds. |
| Split | do | [3] | 10 | N. a. |
| Peppers | do | 20,432 | 19,317 | |
| Potatoes, white or Irish: | | | | |
| Certified seed | do | 79,308 | 113,546 | 2,570 million pounds. |
| Other potatoes (table stock) | do | 59,190 | 83,819 | 20,946 million pounds. |
| Squash | do | 170 | 484 | N. a. |
| Tomatoes, natural state | do | 192,318 | 215,190 | 8,875 million pounds. |
| Truffles | do | 11 | 25 | No United States production. |
| Turnips and rutabagas | do | 136,960 | 113,924 | N. a. |
| Other fresh vegetables | do | 2,950 | 4,214 | |
| Canned: | | | | |
| Mushrooms | do | 578 | 1,280 | Included in fresh production |
| Peas | do | 276 | 74 | |
| Tomatoes | do | 54,761 | 60,404 | |
| Other vegetables, canned | do | 391 | 449 | |
| Farinaceous substances: | | | | |
| Arrowroot | do | 7,255 | 9,028 | No United States production. |
| Sago | do | 1,900 | 7,091 | |
| Tapioca | do | 74,549 | 53,900 | |
| Prepared or preserved: | | | | |
| Bean cake, miscellaneous, etc | do | 145 | 18 | Included in fresh production |
| Pickled vegetables | do | 6,733 | 9,534 | |
| Pimientos in brine, oil, etc | do | 553 | 3,547 | |
| Sauces, vegetable and fruit | do | 3,035 | 2,794 | |
| Tomato paste and sauce | do | 8,357 | 3,846 | |
| Other vegetables, prepared or preserved | do | 12,132 | 7,627 | |
| Other vegetable preparations: | | | | |
| Chicory, crude roots, dried | do | 5,828 | 3,926 | |
| Chicory, ground or prepared | do | 4,972 | 5,203 | |
| Miscellaneous vegetable products: | | | | |
| Argols, tartar, and wine lees | do | 11,181 | 759 | N. a. |
| Broomcorn (2,000 pounds) | Ton | 5 | 5 | 61.6 million pounds. |
| Castor bean pomace (2,000 pounds) | do | 9 | 38 | N. a. |
| Citrus fruit juices unfit for beverages | Pound | 9 | 48 | |
| Flavoring extracts | do | 57 | 134 | |
| Palm leaf, natural | do | 507 | 1,090 | |
| Sloe berries and juniper berries | do | 39 | 301 | |
| Teasels, not bleached, colored, etc | do | 56 | 60 | |
| Vegetable glue | do | 6 | 50 | |
| Wafers, inedible | do | 20 | 22 | |

[1] Preliminary.
[2] Except as otherwise indicated.
[3] Less than 500.
[4] Commercial hatch.
[5] For data on lactose see "sugar, molasses, and sirups."
[6] Excludes the weight of "other hides and skins," reported in pieces only.
[7] This includes appreciable quantities of fresh, chilled or frozen boned beef, believed erroneously classified.
[8] Includes tendons, crude marrow and rennet, etc.
[9] Reported in value only.
[10] Fiscal year.

Mr. MORSE. Yes, sir. We have moved to restrict imports. We have had to recommend restrictions, as you know, on imports of oats and rye.

Senator MALONE. How do you restrict imports of oats or rye?

Mr. MORSE. That is by quota.

Senator MALONE. Who judges when and to what extent we shall restrict such imports?

Mr. MORSE. The responsibility in many instances goes to the Tariff Commission and those references are made by the President. They then become a matter of formal inquiry to determine if import duties or quotas are justified.

Senator MALONE. What does the Tariff Commission have to do with it under the present situation?

Mr. MORSE. They make a study of any cases referred to the Commission.

Senator MALONE. They only make such a study when they are specifically requested to do so?

Mr. MORSE. Yes, sir.

Senator MALONE. What did happen when the influx of barley began to knock the boys down that were raising barley in this country? Just what was the procedure?

Mr. MORSE. Can you respond to that, Mr. Roberts? Are you familiar with the barley case?

Mr. ROBERTS. Yes. Whenever the imports of any agricultural commodity are materially interfering with any Department of Agriculture program or threaten to interfere with the program, and the Secretary has reason to believe that that is the case, he has an investigation made within the Department of Agriculture to determine whether to ask the President to take further action.

Then, if it is found that from our analysis in the Department of Agriculture the imports are likely or are interfering with the Department's program, the Secretary requests the President to direct the Tariff Commission to hold public hearing and make an investigation.

Senator MALONE. Then what?

Mr. ROBERTS. They proceed with their investigation and their public hearing and make such recommendations to the President as they see fit according to the facts that they have found. Then the President takes the action under section 22 as he evaluates the report from the Tariff Commission.

Senator MALONE. He can take action or he may not take it as he sees fit, is that right?

Mr. ROBERTS. As the lawyers interpret the provisions of section 22 we understand that the legislation directs the President to take action when he finds these facts to exist.

Senator MALONE. Suppose he does not agree with the Tariff Commission?

Mr. ROBERTS. Well, I presume that it depends upon the facts that the President finds to exist on the basis of the Tariff Commission's investigation and public hearing.

Mr. MORSE. I think the procedure, Mr. Chairman, would be to ask for the development of more information if he is in doubt about sufficiency of the facts that have been furnished. With our neighbor to the north, Canada particulary, we have found that they have been cooperative in voluntary actions in a number of cases so that the formal proceedings have not been necessary in all instances.

Senator MALONE. Well, I am trying to figure out whose responsibility it is and what must be done, if anything. Now you just had an experience in wool, did you not? What happened there? The Tariff Commission made an examination?

Mr. MORSE. Yes, sir.

Senator MALONE. Who asked them to do that?

Mr. MORSE. That was a request from the Department of Agriculture through the President, I believe.

DISTRESS IN THE WOOL INDUSTRY

Mr. ROBERTS. Yes; the Secretary of Agriculture asked the President to direct the Tariff Commission to make the investigation and hold a public hearing.

Senator MALONE. And they did do that?

Mr. ROBERTS. Yes; the investigation and public hearing were held by the Tariff Commission, and the Tariff Commission then made recommendations to the President.

Senator MALONE. What recommendations did they make?

Mr. ROBERTS. They recommended that an import fee be applied against wool.

Senator MALONE. Would you call that a duty as the Constitution refers to it?

Mr. ROBERTS. It would be in addition to the import duty.

Senator MALONE. Well, it would be an import fee, would it?

Mr. ROBERTS. Yes.

Senator MALONE. Duty or tariff, whatever you want to call it?

Mr. ROBERTS. It would have the same effect.

Senator MALONE. That is what it would be as a matter of fact?

Mr. ROBERTS. Yes, sir.

Senator MALONE. What happened?

Mr. ROBERTS. The President announced, I believe it was less than 2 weeks ago, that he had received the recommendations from the Tariff Commission.

Senator MALONE. What were the recommendations?

Mr. ROBERTS. For an import fee on wool of 10 cents a pound and on tops, 11¼ cents.

Senator MALONE. In addition?

Mr. ROBERTS. In addition.

Senator MALONE. What is the fee now?

Mr. ROBERTS. The duty on wool is now 25½ cents a pound.

Senator MALONE. That would have made it 35½ cents per pound.

Mr. ROBERTS. Yes.

Senator MALONE. Total import fee or duty as the Constitution of the United States set forth. Now what happened then after that?

Mr. ROBERTS. The President's announcement indicated that in view of his recommendations in the farm program for payments to wool producers that he was not taking the action that the Tariff Commission had recommended.

Senator MALONE. In other words, he is not compelled to take it at all, is that right, Mr. Morse?

Mr. MORSE. I assume that he has discretion; that is something that we ought to have our solicitors respond to.

Senator MALONE. Do you have him here?

Mr. MORSE. No, sir. I am sorry. We will be glad to get the answer into the record.

Senator MALONE. I hope then that you will have the solicitor tell the committee in your corrected testimony the answer to the question as to how this thing operates.

Who asks the Tariff Commission to make such an investigation whenever it is thought or concluded by your Department, and your Department is where it is instigated?

Mr. MORSE. Yes, sir.

Senator MALONE. Is it the only Department that can instigate such an examination?

Mr. MORSE. That we will have to determine.

Senator MALONE. Then have your solicitor tell us who may instigate such an inquiry; that is, whether the President can do it, whether the Congress can do it, whether your Department can do it, and if all three can or additional Departments can ask the Tariff Commission to make an investigation of any product.

Mr. MORSE. We will be very glad to.

Senator MALONE. What happens then when they make the investigation at the instigation of the authority, proper authority or authorities, and then when they make their findings who are they submitted to and what action may be taken, whether the recommendation must be taken or whether it can be changed and to what extent or ignored or where does it go from there?

Mr. MORSE. Yes, sir. We will be glad to get that procedure set forth.

(The information referred to is as follows:)

SECTION 22 PROCEDURES

Section 22 of the Agricultural Adjustment Act, as amended, provides for the imposition of fees or quantitative limitations on imports of articles which are being or are practically certain to be imported into the United States under such conditions and in such quantities as to render or tend to render ineffective or materially interfere with any price support or other program of the Department of Agriculture, or decrease substantially the amount of any product processed in the United States from an agricultural commodity with respect to which such a program is being undertaken.

The procedures followed under section 22, briefly, are as follows:

The responsibility for initiating action is vested by statute in the Secretary of Agriculture who makes a preliminary investigation of the need for section 22 action upon his own initiative or upon the request of any interested party. If on the basis of this preliminary investigation the Secretary has reason to believe there is need for action, the Secretary so advises the President. If the President agrees that there is reason for such belief he directs the Tariff Commission to make an investigation and report back to him.

The Tariff Commission gives public notice of the institution of its investigation which includes a public hearing at which all interested parties are given an opportunity to appear and to be heard. Upon completion of its investigation, the Tariff Commission submits a report, together with findings and recommendations, to the President. The statute provides that if on the basis of such investigation and report to him of findings and recommendations the President finds the existence of such facts, he shall proclaim such fees or quantitative limitations as he finds and declares shown by such investigation to be necessary to remove the interference caused by the imports. Under this provision, the President makes an independent finding and is not bound to the findings and recommendations of the Tariff Commission. Furthermore, paragraph (e) of section 22 provides that any decision of the President as to facts under that statute shall be final.

Senator MALONE. Go right ahead.

Mr. MORSE. May I comment in reference to the matter of additional fees on wool? Manufacturers have called on me on more than one occasion and called attention to the fact that they were losing much of the wool market to competing fibers. They were very much concerned that some of their plants were down, probably others would

be closed unless wool prices were kept somewhat competitive. With the advance of science in the fiber field there is a problem of the extent to which wool will continue in use.

Senator MALONE. Could you tell the committee just for their information to what extent the price has increased on a yard, say, in order to determine what a yard would be? I mean just a yard square, 3 feet square, of woolen cloth of ordinary weight. You can specify the weight, and as to just what additional price it would be for good quality manufactured cloth, the increase by having adopted this 10-cents-per-pound additional tariff or duty recommended by the Tariff Commission.

Mr. MORSE. We will be glad to provide that.

Senator MALONE. Do you have any idea at the moment how much that would be?

Mr. MORSE. No, sir, I do not. That difference would not be as much as a good many people would anticipate.

Senator MALONE. I predict you cannot find it, but I may be wrong.

Mr. MORSE. The manufacturers use some figures, but I do not have them in mind.

Senator MALONE. I have them. I want to say to you that the people of this country are pretty well mixed up. I do not know who will survive, but it is a cinch that the people who produce the material will not survive. But you now have made up your minds in the Department of Agriculture to go through with a subsidy and allow any wool to be imported at the 25½-cent-per-pound duty or tariff and then you will pay the producers that are able to survive or see fit to stay in the business, you will pay them a certain amount of money to stay in the business, is that true?

Mr. MORSE. That is the recommendation, that the aid to the producers of wool in this country be through supplementing their income rather than through increased tariff protection.

Senator MALONE. Who determines how much it will be supplemented?

Mr. MORSE. That would be at the discretion of the Secretary, I believe.

Senator MALONE. From time to time?

Mr. MORSE. Yes, sir.

Senator MALONE. Then the Secretary of Agriculture is taking on the responsibility of telling the wool producers each year as to how much he will supplement their income over what the market price might be?

Mr. MORSE. Yes, sir. The bill as proppsed, final action has not been taken, provides for the objective of something like 300 million pounds' production of shorn wool in this country.

Senator MALONE. What is the normal production, say, 10 years ago or 20 years ago?

Mr. MORSE. I believe it was within that range. Of course, it is much lower now.

Senator MALONE. Are you sure?

Mr. MORSE. It is much below the 300 million pounds.

Senator MALONE. Does anyone here know as to what production of wool amounted to a few years ago?

Mr. MORSE. We can look it up.

The sheep industry may have expanded some, I believe, in certain farming areas, but it has continued to decline generally, especially in the western areas.

Mr. THOMPSON. We have the shorn and total wool production.

Senator MALONE. Just give us the wool production in the United States, and we can separate it.

Mr. THOMPSON. Do you only want to go 10 years back?

Senator MALONE. I want to get an idea of what this production was over the years before we began to ship in wool over conditions that amounted to free trade.

Mr. RAWLINGS. I can give it to you for 5 years back.

Mr. THOMPSON. I can give it to you as far back as you want to go.

(Data discussed subsequently furnished and placed in the record at this point by direction of the chairman.)

*United States population, number of sheep and apparel wool production, imports and mill consumption in the United States*

| Year | Population of United States | Sheep, Jan. 1 (1,000 head) | | Wool, grease basis (million pounds) | | | | | Wool, scoured basis (million pounds) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Production | | | Imports [2] | Mill consumption [2] [3] | Production | | | Imports | Mill consumption [3] |
| | | All sheep | Stock sheep | Shorn | Pulled [1] | Total | | | Shorn | Pulled | Total | | |
| | *Million* | | | | | | | | | | | | |
| 1920 | 105.2 | 40,743 | 37,328 | 251 | 69 | 320 | (*) | 601 | 110 | 32 | 142 | (*) | 264 |
| 1925 | 117.5 | 38,543 | 34,469 | 253 | 75 | 328 | 224 | 572 | 116 | 35 | 141 | 99 | 252 |
| 1926 | 119.0 | 40,363 | 35,719 | 269 | 79 | 348 | 236 | 579 | 119 | 37 | 156 | 104 | 255 |
| 1927 | 120.7 | 42,415 | 38,067 | 289 | 80 | 369 | 176 | 588 | 127 | 38 | 165 | 77 | 259 |
| 1928 | 122.2 | 45,258 | 40,689 | 315 | 83 | 398 | 108 | 528 | 138 | 39 | 177 | 47 | 232 |
| 1929 | 123.5 | 48,381 | 43,481 | 328 | 87 | 415 | 138 | 575 | 144 | 41 | 185 | 61 | 253 |
| 1930 | 124.8 | 51,565 | 45,577 | 352 | 99 | 451 | 105 | 456 | 155 | 46 | 201 | 46 | 201 |
| 1931 | 125.8 | 53,233 | 47,720 | 376 | 106 | 482 | 53 | 540 | 166 | 49 | 215 | 23 | 238 |
| 1932 | 126.6 | 53,902 | 47,682 | 351 | 107 | 458 | 20 | 428 | 154 | 51 | 205 | 9 | 189 |
| 1933 | 127.3 | 53,054 | 47,303 | 374 | 102 | 476 | 53 | 558 | 165 | 48 | 213 | 23 | 246 |
| 1934 | 128.1 | 53,503 | 48,244 | 369 | 97 | 466 | 42 | 381 | 162 | 46 | 208 | 18 | 168 |
| 1935 | 129.0 | 51,808 | 46,139 | 361 | 106 | 467 | 61 | 725 | 159 | 50 | 209 | 27 | 319 |
| 1936 | 129.8 | 51,136 | 45,435 | 353 | 106 | 459 | 159 | 681 | 155 | 50 | 205 | 70 | 300 |
| 1937 | 130.6 | 50,848 | 45,251 | 356 | 106 | 462 | 206 | 623 | 157 | 49 | 206 | 91 | 274 |
| 1938 | 131.6 | 51,063 | 44,972 | 360 | 103 | 463 | 45 | 499 | 158 | 49 | 207 | 20 | 220 |
| 1939 | 132.7 | 51,348 | 45,463 | 362 | 103 | 465 | 133 | 666 | 159 | 49 | 208 | 59 | 293 |
| 1940 | 134.0 | 52,107 | 46,266 | 372 | 99 | 471 | 269 | 705 | 164 | 46 | 210 | 118 | 310 |
| 1941 | 135.3 | 53,920 | 47,441 | 388 | 105 | 493 | 761 | 1,169 | 171 | 49 | 220 | 335 | 514 |
| 1942 | 136.7 | 56,213 | 49,346 | 388 | 107 | 495 | 1,039 | 1,274 | 171 | 50 | 221 | 457 | 561 |
| 1943 | 138.6 | 55,150 | 48,196 | 379 | 104 | 483 | 903 | 1,371 | 167 | 49 | 216 | 397 | 603 |
| 1944 | 140.3 | 50,782 | 44,270 | 338 | 118 | 456 | 784 | 1,311 | 149 | 55 | 204 | 345 | 577 |
| 1945 | 141.8 | 46,520 | 39,609 | 308 | 113 | 421 | 950 | 1,339 | 136 | 52 | 188 | 418 | 589 |
| 1946 | 143.4 | 42,436 | 35,525 | 281 | 98 | 379 | 1,075 | 1,385 | 124 | 46 | 170 | 473 | 610 |
| 1947 | 146.1 | 37,818 | 31,805 | 251 | 91 | 342 | 589 | 1,195 | 111 | 42 | 153 | 259 | 526 |
| 1948 | 148.7 | 34,827 | 29,486 | 232 | 75 | 307 | 560 | 1,103 | 102 | 35 | 137 | 246 | 485 |
| 1949 | 151.3 | 31,654 | 26,940 | 213 | 57 | 270 | 352 | 770 | 94 | 26 | 120 | 155 | 339 |
| 1950 | 153.8 | 29,826 | 26,182 | [4] 215 | 52 | [4] 267 | 568 | 993 | 95 | 24 | 119 | 250 | 437 |
| 1951 | 156.5 | 30,635 | 27,253 | 226 | 41 | 267 | 618 | 868 | 99 | 20 | 119 | 272 | 382 |
| 1952 | 159.2 | 32,088 | 28,050 | [4] 232 | 54 | [4] 286 | 504 | 788 | 102 | 25 | 127 | 248 | 347 |
| 1953 | 161.9 | 31,861 | 27,857 | [4] 230 | [4] 66 | [4] 296 | [4] 376 | [5] 801 | 101 | 31 | 132 | 166 | 353 |
| 1954 | 163.4 | 30,902 | 26,905 | | | | | | | | | | |

[1] Converted to domestic greasy shorn equivalent on basis of 1 pound pulled wool equal to 1.6 pounds greasy shorn wool.

[2] Apparel wool converted to domestic greasy shorn equivalent on basis scoured yield equal to 44 percent of greasy shorn wool.

[3] Mill consumption by years and the totals of production andi mports do not balance due to difference in stocks carried over from year to year.

[4] Revision based upon Wool Production and Income Report dated Feb. 25, 1954.

[5] Preliminary or estimated.

*Not available.

Senator MALONE. What was it in, say, 1940?

Mr. THOMPSON. 471 million pounds of shorn and pulled wool, greasy shorn basis.

Senator MALONE. What was it in 1935?

Mr. THOMPSON. 467 million pounds.

Senator MALONE. 1930?

Mr. THOMPSON. 451 million pounds.

Senator MALONE. What was it in 1945?

Mr. THOMPSON. 421 million pounds.

Senator MALONE. And 1950, what was it then?

Mr. THOMPSON. 267 million.

Senator MALONE. How much?

Mr. THOMPSON. 267 million.

Senator MALONE. Do you have 1925?

Mr. THOMPSON. Yes, sir, 328 million pounds.

Senator MALONE. What was it in 1920?

Mr. THOMPSON. 320 million pounds.

Sanator MALONE. What was the sheep population, the number of sheep in 1920 as compared to 1950?

Mr. THOMPSON. The number of stock sheep in 1920 was 37 million head. In 1950 it was 26 million.

Senator MALONE. What was it in 1940?

Mr. THOMPSON. 46 million stock sheep.

Mr. MORSE. The labor factor, as you know is important in the western country. High-priced labor and labor shortages during the war was a major factor causing the decrease in sheep numbers. During the 1930's labor was available, and then as we entered the war labor became short, and that became an important determining factor in the decline of sheep in the West.

Also as you would well appreciate, was the fact that we had high cattle prices, and there was a tendency to get away from the high-priced labor and into cattle. Cattle require less labor and the attractive prices caused a very rapid shift to take place.

Senator MALONE. What was the tariff on wool in 1930?

Mr. ROBERTS. Thirty-four cents a pound was the basic rate for the main class of apparel wool imported into the United States.

Senator MALONE. When was that lowered?

Mr. ROBERTS. It was in 1948.

Senator MALONE. And that was lowered to 25 cents or 25½?

Mr. ROBERTS. 25½, that is right.

Senator MALONE. That agreement was made by the State Department with some foreign nation?

Mr. ROBERTS. Yes, sir.

Senator MALONE. What nation?

Mr. ROBERTS. It was made at the Geneva meeting of GATT, the General Agreement on Tariffs and Trade. It was negotiated primarily with Australia.

Senator MALONE. 1945?

Mr. ROBERTS. 1947. It was also included in the negotiations at that time with New Zealand and the Union of South Africa, which are also members countries in the GATT.

Senator MALONE. Now you feel, Mr. Morse, that the way to encourage the maximum production of sheep and wool in this country is

through subsidy and not through a duty as outlined in the Constitution of the United States or tariff, as we have customarily called it?

Mr. MORSE. Yes, sir, when you take into consideration not only the competition of synthetic fibers with the sheep industry but also the economy in the United States. The people employed in wool manufacturing and the investment in wool factories, should all be taken into consideration. This wool problem was studied thoroughly all through last year.

Senator MALONE. By whom?

Mr. MORSE. Broadly by all of those who were studying the farm programs and specifically by the woolgrowers and by others interested in the wool industry. The recommendations incorporated in the President's message to Congress were the best judgments out of all these studies. That was what the President accepted and placed before Congress.

Senator MALONE. What was the conclusion of the National Wool Growers?

Mr. MORSE. I do not have their specific conclusions. I know there was a good deal of shifting of judgments as more information was developed and as the study went on. The study became more intensive after the farm and wool organizations had held their annual meetings.

Senator MALONE. Do you mean this year?

Mr. MORSE. Yes, sir, in 1953.

Senator MALONE. What are they still for? Do you have an idea what they are for at the moment?

Mr. MORSE. I believe their testimony is going into or has been already incorporated in the hearings on the wool bills.

Senator MALONE. It has been incorporated in this committee.

Mr. MORSE. In this committee, too?

Senator MALONE. Yes.

Mr. MORSE. I think we can get their testimony as far as this legislation is concerned; it would be very easy, of course, to get, and you might want it made a part of the record here, as to what the testimony from the different organizations was on the wool bill.

Senator MALONE. I am interested in your judgment and in the judgment of the people who are trying to produce wool.

Mr. MORSE. Yes, sir.

Senator MALONE. Now I am going to ask you to pay particular attention to this question on a yard of cloth, as to what is the difference in the price per yard. If you want to take several kinds of wool and cloth, do that as regards the 10 cents additional tariff and what would be the difference. What would be the difference in the cost of a suit of clothes, for example? I am going to ask you to do that. I know you will have to look it up, and I am going to have to look it up also.

Mr. MORSE. We will do that.

(The information referred to is as follows:)

UNITED STATES TARIFF COMMISSION'S RECOMMENDATION FOR IMPOSITION OF IMPORT DUTIES OF WOOL UNDER SECTION 22 OF THE AGRICULTURAL ADJUSTMENT ACT, AS AMENDED

**Imposition of import fees of 10 cents per clean pound on wool would have the following effect on prices in this country:**

GREASE WOOL

Prices of grease wool in the United States would be increased about 4 cents a pound, or about 8 percent above present levels. The average yield of grease wool for all grades is estimated at about 44 percent.

WOOL FABRICS

It is estimated that the cost of the wool going into fabrics would be increased by about 8 cents a square yard (based upon a linear yard of a 12-ounce fabric, 54 inches in width). In addition, there doubtless would be a certain amount of pyramiding of this and other costs in the resulting price of the fabric.

SUIT OF CLOTHES

On this basis, the cost of the wool going into a suit of clothes would be increased by about 40 cents (approximately 5 square yards at 8 cents per yard). However, in actual practice, this cost would doubtless be pyramided. The extent of the pyramiding cannot be specifically determined although it has been indicated that such pyramiding might be from 2 to 4 times the additional cost of the wool in the fabric. Thus, allowing for pyramiding of costs in processing and distribution all the way from the raw wool to the sale of the suit to the consumer, the increased cost of the suit resulting from a 10-cent-per-pound, clean basis, import fee on wool could amount to from 80 cents to $1.60, depending upon the grade and quality of the wool, the construction of the fabric, style of the suit, demand and supply conditions, and the pricing practices in suit distributing channels. What will actually happen to the price of a suit with a given change in the price of wool is, of course, a very complex problem, and there is no set answer.

In appraising the probable effect of an increase in the duties on imports of wool, the resulting advance in prices of wool in the domestic market would tend to weaken the demand for woolen items and the competitive position of wool with other fibers, especially the manmade fibers. In this connection, it is interesting to note that the output of manmade fibers from which men's and women's clothing is made has increased from 300,000 pounds in 1940 to over 55 million in 1953. Along with this increased production, prices of competitive fibers have been reduced in relation to wool and in addition, perhaps their quality has been improved.

Senator MALONE. I will tell you in connection with the National Wool Growers that they were for the tariff, and I think we are familiar with most of the arguments that of course you must not talk about tariffs; that is too old-fashioned, and besides, it might hurt someone's feelings, but this committee is not concerned with that either.

Mr. MORSE. As far as agriculture is concerned, we want the best answer for the sheep industry.

Senator MALONE. If you are to get the best answer you will have to protect the sheep industry. What inducement is there for going into the sheep industry now? If you have the judgment of the Secretary of Agriculture each year as your only safeguard and where the Congress may fail at any moment to appropriate enough money to pay the subsidies, what inducement do you have?

Mr. MORSE. Under the recommendation and the bill as it is going through Congress the money will be provided.

Senator MALONE. It may or it may not be. I was in hopes it would not be.

Mr. MORSE. I was informed that the wool bill was reported out of the Senate committee. The discretion is not entirely open for the Secretary.

Senator MALONE. Who has the discretion?

Mr. MORSE. I mean that the bill has also a proviso for the encouragement of the sheep industry to a point of producing 300 million pounds

of wool so the Secretary would be under obligation to take that into consideration.

Senator MALONE. Well, you have decided then here in Washington that about 300 million pounds of wool is what the United States should produce, and therefore you will arrange your subsidies and your payments to either decrease the amount if it goes over that amount, to put them out of business or increase to put them in business. Is that the way it would work?

Mr. MORSE. The Congress, as you know, some years back expressed a judgment 360 million pounds of shorn wool should be produced.

Senator MALONE. How did they express that judgment?

Mr. MORSE. It was in connection with the Price Support Act, was it not?

Mr. THOMPSON. Yes.

Mr. MORSE. In connection with the Agricultural Act.

Mr. THOMPSON. May I add a little there?

Mr. MORSE. Yes.

Mr. THOMPSON. The 1949 act says the Secretary should support the price of wool in the range from 60 to 90 percent of parity in order to encourage the production of 360 million pounds of shorn wool.

Senator MALONE. That sounds exactly like a Washington decision.

Mr. THOMPSON. That is a congressional act.

Senator MALONE. Yes, I know. It sounds like a congressional act.

Mr. MORSE. It is my understanding, however, Senator, that those who worked on this wool problem and who advised us and further advised the President that that figure was rather unrealistic under present circumstances.

Senator MALONE. Too high or too low?

Mr. MORSE. Too high. And they concurred in the fact that some smaller figure in the present situation would be acceptable to put into the bill as the level to be encouraged through an incentive price. So there was the adoption of this 300 million pounds figure for shorn wool production.

Senator MALONE. That is in the bill?

Mr. MORSE. Yes, sir.

Senator MALONE. Here is a copy of the statement of the National Wool Growers, and I will suggest that it be inserted in the record at this point.

(The information referred to is as follows:)

Ray W. Willoughby of San Angelo, Tex., president of the National Wool Growers Association, has issued the following statement:

"The woolgrowers of the United States will support and work for the passage of President Eisenhower's wool program in Congress, as introduced in legislative form by Senator George Aiken and Congressman Clifford Hope.

"I make this statement at the conclusion of 2 days of meetings in Washington between representatives of every range sheep-producing State of the West and both legislative and administrative officials.

"There are, of course, refinements in the legislation as presented, which the woolgrowers desire and which we believe the Department of Agriculture will join us in bringing before the committees of both Houses considering this measure.

"This endorsement of the President's wool program was not quickly or easily arrived at because the industry believes that any long-range solution to the problem created by the 50-percent decline in production over the past decade must of necessity be found in a fair and equitable tariff to protect both producers and workers of the United States against unfair competition from countries which do not have the standards of living and wage levels of this country.

"Respecting the sincerity of the President in his decision that world conditions force him to oppose a tariff increase at this time, the woolgrowers are wholeheartedly of the opinion that a payment program, based upon conditions which will, first, provide an incentive to reverse the downward trend in American wool production, and, secondly, base that incentive payment upon wool tariff receipts rather than funds taken from the American taxpayer, is a vast improvement over the past and present loan support program which results in a Government stockpile of wool.

"We call to the attention of the public that the Government-owned wool stockpile of today is one which the woolgrowers have long felt unnecessary because we produce less than one-third of the wool used in the United States. But previous support programs, patterned upon the same principles of those of the farm commodities produced in surplus, have created the paradox of a deficiency crop piling up in Government hands while foreign wool took our domestic markets under the present tariff rates, with the American taxpayer footing the bill for storage and losses. We have constantly, and still do, oppose such support methods.

"Under the principles of the administration program, growers will sell in the open market, but in lieu of a proper tariff level, the present wool tariff revenue will be used to provide the funds for a direct payment to the grower in the event average prices fall below a level which will provide an incentive for the American growers to provide the Nation with wool as a recognized critical and essential material for the national security and welfare.

"I have just received a telegram from Mr. James Lemmon of South Dakota, president of the National Wool Marketing Corp., sent from Chicago where this largest cooperative wool-marketing group is holding its annual membership meeting, stating that they too have endorsed the principles of this incentive payment program advanced by the President.

"The National Wool Growers Association, in endorsing this administration's wool program, reaffirms its position that it will work for a national foreign trade policy which will make it unnecessary for either the woolgrowing industry, or any other domestic producing group, to depend upon the Government rather than the free markets of the United States for its income. This endorsement does not mean that the program is being sought by the industry as a substitute for fair and equitable tariff, but as a substitute for a support program which has both cost the taxpayers money and completely failed in its objective of assisting our segment of agriculture."

Senator MALONE. The resolution passed by the National Wool Growers has just been handed to me, and I would like to comment that I see they say they are still for it as late as this morning. Now I understand your position thoroughly in this matter, and it is in line with all the Government decisions for 22 years that you are going to regulate the number of sheep in the country, the number of pounds of lead and zinc produced through subsidies, you are going to regulate the number of practically everything that we raise or produce.

Of course personally I do not think it will work, and I do not think you can get any new money in the sheep business when it is subject to the Secretary of Agriculture or anyone in Washington to carry out and subject also to the appropriations by Congress to pay the subsidy.

One of these days we will just quit appropriating money.

Mr. MORSE. Senator, it is my understanding that it is the announced policy——

Senator MALONE. By whom?

Mr. MORSE. Of the administration, and I believe that the record since we have been in office would bear it out, that we want to get away from regulation and to get away from controls.

Senator MALONE. I think it is exactly the opposite. I think we are getting into more regulation than the other administration.

Mr. MORSE. We are compelled to move into regulation on crop acreages under the law. We must administer the law.

Senator MALONE. Why do you create new ones? Now we are going to regulate the number of pounds of wool by the amount of subsidy you will pay.

Mr. MORSE. No, we will not regulate it. We will merely maintain a supplemental payment if Congress decides this is a sound law. We would make a supplementary payment to sheep producers as encouragement to produce wool. How much they produce and how many sheep they maintain will be up to the sheep people.

Senator MALONE. But if they produce more than the 300 million pounds or what you decide to be the economic factor, then you can reduce the payments, can you not?

Mr. MORSE. We can. However, we do not foresee that——

Senator MALONE. But you can? Would you answer that question?

Mr. MORSE. Yes, sir.

Senator MALONE. Then as long as you can do it, why would anyone else go into the sheep business?

Mr. MORSE. That would depend on economic conditions.

Senator MALONE. Depend on people, how silly people were with the expenditure of their money, I expect.

Mr. MORSE. It will depend upon the comparative opportunities. You will notice that while farmers were short of income but had labor available during the 1930's, they had large numbers of sheep. As they moved into the war period and alternate opportunities developed that seemed more attractive to them, they reduced the number of sheep.

Senator MALONE. Are cattle more attractive now?

Mr. MORSE. I would judge that they are more nearly on a par with the sheep industry. The farmers who have been expanding in sheep are doing so for the reason that they feel that sheep are a sound investment and an important farm enterprise for them.

Senator MALONE. Are you sure that that is a fact, that they feel it is a sound investment, or are they just jumping from pillar to post trying to survive?

Mr. MORSE. No, sir, that has been a recent trend, and a solid trend.

Senator MALONE. We will get on to your statement here. You furnished me, signed by J. Earl Coke, Assistant Secretary, a statement covering generally the materials that we made inquiry about and then we asked a general question or at least suggested that you cover the entire field in agricultural products. Do you have a copy of that statement?

Mr. MORSE. Yes, sir, I have it here.

Senator MALONE. How would you suggest handling this, to go through and comment on the statement?

Mr. MORSE. We would want to proceed as you would prefer. This was prepared by men, some of whom are here, and they will be in the best position to discuss it.

Senator MALONE. I want to say that as late as this morning the representatives of the National Wool Growers in Washington said that they are standing on the principle outlined in the resolution. I also want to say that the sheep people as far as my part of the country is concerned are in a bad situation, and they are grasping at this subsidy thing in order to stay alive.

I do not have the heart to go over on the floor, and that is where that bill is this afternoon, but I do not want to talk about it. I think we

will come back to it in due time, and I do not think it will be very long. But when we turn down the 12 cents a pound that the Tariff Commission recommended you departed from all principle as far as principle is concerned upon which you could invest money.

I will just read this resolution:

We wish to reaffirm the historical and traditional position of the National Wool Growers Association that an adequate tariff on wool is the proper way to safeguard the sheep industry of the United States.

The promotion of world trade should be on the basis of fair and reasonable competition and must be done within the principle long maintained that foreign products of underpaid foreign labor shall not be admitted to the country on terms which endanger the living standards of the American workingman or the American farmer, or threaten serious injury to a domestic industry.

The United States Congress is urged to resume its constitutional responsibility of regulating foreign commerce through the adjustment on duties, imposts, and excises through its agent, the Tariff Commission, and allow the 1934 Trade Agreements Act, the so-called Reciprocal Trade Act, which transferred such responsibility to the President, to expire in June of 1954. End quote. Adopted December 10, 1953.

Franklin advises requesting hearing before your committee Friday, December 18. I will be there.

NATIONAL WOOL GROWERS ASSOCIATION.
J. M. JONES.

They both appeared before this committee, and as late as this morning they reaffirmed this position. They are going to take the subsidy because they have to, but they do not agree with it, and I will say for your information that I do not know of anyone in the mineral business or in the wool business or any other business that agrees with it.

Mr. MORSE. Senator, I may have confused my statement. I was not speaking of the position of the wool industry in reference to the tariffs. I was discussing what I understood was the attitude toward the wool legislation which is before Congress.

Senator MALONE. They have to take it; they have no choice.

Mr. MORSE. Some of my statements I will want to get straightened out in the record.

Senator MALONE. You may do that.

Mr. MORSE. Yes, sir; because I was discussing the extent to which the wool people had participated in support of the wool bill before Congress.

Senator MALONE. There is another slight difference in subsidies and in tariffs or duties as the Constitution calls them, and that is that when you collect it from the Nation that difference between the cost of labor and the taxes in this country as against the chief competing nation which has been judged to be 12 cents by the Tariff Commission, that is new money coming into the Treasury of the United States. It can be used to lower taxes or pay the national debt or anything.

But when you pay a subsidy to your own woolgrowers and store the wool and buy wool from all the foreign nations that care to ship it here, and a sheep costs about one-fourth the amount, a sheep unit, to raise in Australia as it does here, you are riding for the same kind of deal that we had in the wheat. That is new money that comes out of the taxpayers and the taxpayers in my country are getting very tired of it.

I am getting tired of it myself.

Mr. MORSE. In the operation of the new legislation we would not be storing wool. The wool that would be produced in this country would move into the trade and would be consumed.

Senator MALONE. What becomes of the wool that comes in from the outside under the 25½-cent tariff?

Mr. MORSE. Our wool would sell competitively and would not be stored.

Senator MALONE. But what wool do you store? Suppose there was more coming in than you can use, what becomes of it?

Mr. MORSE. If the Government is not in the market, the market would adjust to a level where there would not be more imported than would be taken by the manufacturers.

Senator MALONE. Mr. Morse, if I understand this, the Government does not need to be in the market. If they can pay 25½ cents a pound and still sell it on the open market and make a profit, which they can do, then what are you going to do with the surplus wool whether you call it ours or somebody else's? You are going to be like the banker in 1932 when the man went in to find if he could borrow a little money to feed his sheep through the winter, and the banker said, "I have loaned you too much money."

This fellow looked at him a minute and said, "Were you ever in the sheep business?"

The banker said, "No; I never was."

The farmer said, "Well, you are in it now. Goodby."

That is where you are going to be.

Mr. MORSE. This program was recommended——

Senator MALONE. By whom?

Mr. MORSE. By the various groups, advisory groups, that we work with, including woolgrowers.

Senator MALONE. Would you give me a list of those advisory groups for the purpose of the committee?

Mr. MORSE. We would be happy to put them in the record.

Senator MALONE. And their general statements.

Mr. MORSE. Relating to the wool situation?

Senator MALONE. Yes.

Mr. MORSE. Included, of course, was the National Agricultural Advisory Commission, which studied all these proposals.

Senator MALONE. National Agricultural Advisory Commission. Who are the members of that Commission?

Mr. MORSE. That is a commission which the President appointed, following his election, as an interim commission.

Senator MALONE. Who are they?

Mr. MORSE. In July, by Executive order, it was set up formally. Dean W. I. Myers, of Cornell, is Chairman.

Senator MALONE. They have an agricultural department at Cornell?

Mr. MORSE. Oh, yes, one of the very best agricultural colleges with an outstanding economics department.

Senator MALONE. Is he in the economics department or agricultural department?

Mr. MORSE. He is dean of the college of agriculture. He was at one time Governor of the Farm Credit Administration here in Washington. He is a national authority on agriculture.

Senator MALONE. How long ago?

Mr. MORSE. That was back, roughly, 10 years or so ago.

Senator MALONE. Under the New Deal?

Mr. MORSE. Well——

Senator MALONE. What did you call it? If you had a name for it, tell us what it is.

Mr. MORSE. You have supplied a name.

Senator MALONE. How would you refer to it?

Mr. MORSE. It was the Democratic administration.

Senator MALONE. Mr. Brannan came along a little later, and I think we put him a little to shame of this wool business. He had an idea there, and now we are carrying it out.

Mr. MORSE. We will be glad to supply the remaining 17 members of the Commission.

Senator MALONE. With a very short record of who they are.

Mr. MORSE. Yes, sir. One of them is from Oregon, the head of the agricultural economics department, Dr. Wood; 12 are practical farmers. One of those has sheep and is operating in Montana; one of them, Mr. Chapman, is a sheepman in Michigan, very active in the field, so the sheep industry is represented.

Of course, they drew upon the advice, very widely, of various groups in connection with their work. Also, the President requested the Department to make a special study of the situation. A copy of the report submitted to the President last December is submitted for the record.

(The information referred to is as follows:)

## ACHIEVING A SOUND DOMESTIC WOOL INDUSTRY

A report to the President of the United States from the Secretary of Agriculture, prepared by an Interagency Wool Study Group in the Department of Agriculture, December 1953

### LETTER OF TRANSMITTAL

DEPARTMENT OF AGRICULTURE,
*Washington, December 28, 1953.*

The PRESIDENT,
*The White House.*

DEAR MR. PRESIDENT: I am transmitting herewith a report on the factors currently affecting United States wool production and requirements for the development of a sound and prosperous domestic wool industry while permitting an expansion in foreign trade. This study has been undertaken in accordance with your request of July 9, 1953.

This report analyzes the need for, and methods of achieving increased efficiencies in production and marketing to enhance the competitive position of sheep and wool as a farm and ranch enterprise; increased efficiencies in processing and distribution of wool and woolen products, and improvements in the quality of end products to enhance the demand for and the competitive position of wool; and types of price or income assistance to domestic growers. The conclusions are not presented in the form of recommendations. Rather the effort has been to set forth the facts and questions, and the probable effects of alternative courses of action which must be considered in the development of an improved wool program.

It is my hope that this study will be useful to you and to others, including the Congress and the appropriate policy officials of the Government, who are interested in developing a sound and prosperous domestic wool industry and an expanding foreign trade.

Respectfully,

_____ _____,
*Secretary.*

### SUMMARY

Despite our efforts to ecourage sheep and wool production through both the tariff and loan and purchase programs for wool, sheep, and wool production have remained relatively unattractive compared with alternative farm and ranch enterprises.

An unprecedented decline in sheep and wool production has occurred since 1942 because of: (1) A scarcity of competent labor; (2) low returns from lambs and wool and high risks compared with cattle; (3) inability to increase production efficiency as in other enterprises; (4) uncertainties as to the future levels of tariff protection, price-support operations and public land grazing allotments; (5) increased competition from imported wool and synthetic fibers; and (6) drought; especially in the Southwest.

Consumption of apparel wool in the United States has fallen from postwar levels because of: (1) The abnormally high level of consumption immediately following the war; (2) a trend toward lighter weight clothing; (3) increased competition from budgetary items other than clothing for the consumer's dollar; and (4) increased competition from other fibers, particularly manmade fibers. Per capita consumption of apparel wool currently is about at prewar (1935–39) levels.

We are now importing about five times as much apparel wool as we did prewar largely because of the drastic decline in domestic production. In the prewar period, 1935–39, we were producing nearly three-fourths of the apparel wool consumed in this country. In contrast, current production of domestic wool is about a third of our apparel wool consumption. It is little more than 40 percent of our annual military requirements during World War II.

World production of wool outside the United States, in decided contrast to the situation in the United States, has been at high levels since the end of World War II. World production currently is at record levels. There has been some accumulation of stocks recently in Government hands in the United States and the United Kingdom. Otherwise, world production and consumption appear to be fairly well in balance. A heavy postwar demand provided an outlet between 1946 and 1950 for the 15 billion pounds of apparel wool produced during that period, and for more than 3 billion pounds of wartime stocks.

Domestic problems have resulted from our efforts through price-support programs to check the downward trend in domestic production. Stocks of domestic wool are accumulating in CCC hands while increasing amounts of imported wools are being consumed. This is because duty-paid prices of some imported wools have been lower than the price-support levels required by current legislation for comparable domestic wools. In such a situation, current legislation requires action to limit imports and this, in turn, tends to create problems in international trade.

Despite price supports, domestic growers' prices remain low relative to their costs and risks, and sheep and wool production remain unattractive compared with alternative enterprises. This experience in attempting to check the downward trend in production raises the question of the level of domestic sheep and wool production needed and how best to achieve it without interfering with foreign trade.

A moderate increase in domestic sheep and wool production is suggested in light of (*a*) available feed resources for an expansion in sheep numbers, (*b*) our need for all the lamb and wool we can produce, and (*c*) the desirability of reducing our dependence on foreign sources of wool in times of emergency. It is important, however, that an increase in sheep and wool be accompanied by the achievement of sufficient improvements in the cost and quality of lamb and wool products to enable them to compete for the consumer's dollar without undue increases in subsidies. Current production is about 230 million pounds. The legislative goal established in the Agricultural Act of 1949, as amended, is 360 million pounds.

A moderate increase in domestic consumption of wool is essential if both an increase in production and an expansion in foreign trade in wool are to be achieved. Increases in production will come slowly. Meanwhile, our population is increasing. Hence, a very moderate increase in per capital consumption would permit an expansion in production and in imports without an increase in domestic stocks.

### ACTION NEEDED

Development of a sound and prosperous domestic wool industry will require (1) increased efficiencies in production and marketing to enhance the competitive position of sheep and wool as a farm and ranch enterprise; (2) increased efficiencies in processing and distribution, and further improvements in the quality of end products to enhance the demand for and the competitive position of wool compared with other fibers; and (3) a continuation of some type of price or

income assistance to domestic growers to enable them to compete with imported wools.

Increased efficiencies in production and marketing could be achieved with increased adoption of known improved practices and with the development and adoption of other improved practices. Significant increases in efficiency and quality of wool production could be achieved by wider adoption of known methods of:

(1) Treatment of parasitic and infectious diseases of sheep.

(2) Use of improved breeds of sheep and improved breeding practices.

(3) Adoption of improved farm and ranch management practices including conservation programs to increase the carrying capacity of grazing lands and the administration of public lands to assure their full utilization within their sustained carrying capacity and stability of operations on the ranches using them.

(4) Improving the preparation and packaging and selling procedures of grease wool.

Additional research which would be especially fruitful in increasing the efficiency of production and marketing would include work on:

(1) Treatments for controlling such diseases as vibrionic abortion and the new virus disease, blue tongue.

(2) Nutrition problems.

(3) Adaptation to sheep and wool production of technological developments found profitable by other segments of American agriculture; and

(4) Development of standards for such qualities of wool as color, strength, crimp, etc., to facilitate selling wool on the basis of description.

A much more vigorous educational program is needed to inform producers of the urgent and increasing need for the adoption of improved production and marketing practices and for improvements in both the quality of product and its acceptability to processors and consumers. Direct interest in domestic wool rests primarily with the woolgrowers and they must provide much of the initiative and leadership for such programs.

Increased efficiencies in the processing and distribution of domestic wool and its end products, and improvements in the quality of woolen products which would enhance the demand for, and the competitive position of wool could be achieved by:

(1) Development of chemical treatments to improve the felting characteristics of wool, increase the resistance of wool products to shrinkage during cleaning, provide permanent resistance to insect attack, decrease the retention and facilitate the removal of soil, and reduce scratchiness during wear;

(2) Improvement in the blending qualities of wool and the development of superior blends of wool and other fibers;

(3) Development of improved methods of recovery of, and more profitable uses for unutilized or partially utilized byproducts;

(4) Increased use of modern machinery, better organization of processing operations, improved working conditions, and more efficient utilization of plant facilities;

(5) Improved styling and construction of apparel and household products made of wool or wool blends; and

(6) Increased education of consumers regarding the quality, variety, and adaptability of products made of wool or wool blends.

Price or income assistance to growers can be provided in a number of ways but continuation of some types of assistance is essential, whether it be by tariffs, loan and purchase programs, wool payments to growers, or some other type of program. Without it, further reductions in domestic sheep and wool production would be inevitable.

Any program adopted to provide price or income assistance to wool growers should, of course, be compatible with our overall farm policy as well as our international trade policy. The Secretary of Agriculture currently is engaged in a careful study of the entire farm program to determine the type of program or programs which would best contribute to the welfare of the country and of the agricultural economy. Attention is being given to various methods of achieving the objectives of the agricultural program. Conclusions reached in that comprehensive analysis will have an important bearing in the determination of methods best suited for providing price assistance to woolgrowers.

Alternative methods of providing price assistance are limited for the present by existing legislation. Application of import fees, in addition to prevailing tariffs, on all apparel wool and wool tops imported for consumption has been recommended in accordance with the provisions of section 22 of the Agricultural

Adjustment Act, as amended. However, since increased import fees over an extended period likely would affect adversely both international trade and the competitive position of wool in relation to other fibers, other methods of providing price assistance should be adopted for the long run as quickly as possible.

The methods which have been suggested for providing continuing price or income assistance over the long run generally fall into two groups: (1) Tariffs or import fees, quantitative restrictions on imports, and Government loan or purchase programs, all of which would seek to support the level of wool prices in the market; and (2) direct payments to producers which would be used when necessary to increase growers' returns by supplementing the prices received in the market.

Some of the major effects of various methods proposed for providing price or income assistance to woolgrowers are discussed in the concluding section of this report. It is important to note that the merits of each proposal depend upon both the method and the resultant levels of import barriers and of domestic wool prices to mills and to consumers. Programs which increase import restrictions tend to affect international trade. And, in the long run, programs such as increased tariffs or processing taxes which increase the cost of wool to mills will tend to detract from the competitive position of wool in relation to other fibers. Because of the pyramiding of costs all the way to the consumer, additional costs paid by consumers for woolen products under such programs tend to exceed the combined returns to producers and additional tariff or processing tax revenues accruing to the Government. Conversely, programs which lower costs of wool to mills tend to improve the competitive position of wool and benefit consumers.

## Achieving a Sound Domestic Wool Industry

### INTRODUCTION

Domestic wool production is only one-third of domestic wool consumption. Yet a substantial portion of the domestic wool clip is going to CCC under the price-supprt program while an increasing proportion of wool consumed consists of imported wools.

Section 22 of the Agricultural Adjustment Act of 1933, as amended, provides that whenever the Secretary of Agriculture has reason to believe that imports of a commodity are materially interfering with any loan, purchase, or other program of the Department of Agriculture with respect to that commodity or product thereof, or are reducing substantially the amount of any product processed in the United States from that commodity or product thereof, he shall so advise the President, and, if the President agrees that there is reason for such belief, the President shall cause an immediate investigation to be made by the United States Tariff Commission. President Eisenhower has directed the United States Tariff Commission to make such an investigation on wool.[1] At the same time, the President requested that the Department of Agriculture analyze the factors retarding United States wool production and make "suggestions which will promote the development of a sound and prosperous domestic wool industry and at the same time permit an expanding world trade."[2]

This is a report of the Department of Agriculture on the study requested by the President. It reviews recent trends in domestic production, marketing, and consumption of wool, causes for the decline in production, current supply-demand relationships and price-support programs, world-supply demand trends, and suggests steps to be taken to promote a sound and prosperous domestic wool industry. Because they represent the more pressing problems of the industry, primary emphasis is placed upon the problems of wool rather than lamb and mutton. Emphasis also is placed upon both the opportunity and the responsibility of the various parts of the industry, from the grower to the retailer, to take the steps themselves which are necessary to assure a sound and prosperous domestic wool industry.[3]

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[1] Letter of July 9, 1953, from President Dwight D. Eisenhower to Chairman Edgar B. Brossard, U. S. Tariff Commission.

[2] Letter of July 9, 1953, from President Dwight D. Eisenhower to Secretary of Agriculture Ezra Taft Benson.

[3] Technicians in the Department of Agriculture who contributed significant portions of this report include: Dr. W. M. Scott, Bureau of Agricultural and Industrial Chemistry; Dr. Hugh C. McPhee, Bureau of Animal Industry; Albert M. Hermie, Dr. L. D. Howell, and H. L. Stewart (chairman), Bureau of Agricultural Economics; Walter L. Hodde, Farm Credit Administration; Eugene T. Ransom, Foreign Agricultural Service; F. W. ImMasche, John A. Goe, and Grover Sims, Livestock Branch, Production and Marketing Administration; Saul M. Katz, and Sidney N. Gubin, Office of Price, Production, and Marketing Administration.

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## PART I. DOMESTIC TRENDS

### TRENDS IN PRODUCTION OF SHEEP AND WOOL

Domestic wool production is far short of total domestic consumption at a time when surplus problems are paramount with a number of other agricultural commodities. Whereas production of most other major agricultural commodities increased materially in response to abnormal war and postwar demands, sheep and wool production have been curtailed drastically since 1942.

Numbers of sheep and shorn wool production have gone through several production cycles of varying length since 1884 when, with about one-third our current population, we were producing nearly a third more wool than we are today. Numbers of sheep have increased and decreased cyclically in response to prices and feed conditions. The most drastic decline in history, however, was that from 1942 to 1950 when, in a period of only 8 years, numbers of stock sheep and lambs fell from the near record level of over 49 million head to the record low level of only 26 million. (See appendix table 1.) Sheep numbers increased slightly during 1950 and 1951, but they declined again in 1952 and some further decline is expected in the current year (fig. 1).

Shorn wool production has tended to vary with numbers of sheep on farms and ranches, whereas pulled wool production has varied with changes in the slaughter of sheep and lambs. Since about four-fifths of our wool is produced as shorn wool, total wool production has varied with numbers of sheep. It has varied from a high of nearly 221 million pounds (scoured basis) in 1942 when numbers of all sheep and lambs were at record levels, to a low of 119 million pounds in 1950 (table 1). It was 127 million pounds in 1952, including 102 million pounds of shorn wool (232.4 million pounds grease basis) and 25 million pounds of pulled wool (33.6 million pounds as pulled).

Significant changes over the years include changes in the location and associated changes in the nature of our domestic sheep industry, an increase in fleece weights, and an increasing proportion of farmers' and ranchers' returns from, and hence in their emphasis on lamb and mutton production rather than wool. During the 1880's more than one-half of the 46 million head of stock sheep on United States farms and ranches were located in the native or farm flocks States, but by the 1930's when there were again about 46 million head of stock sheep on all farms and ranches, about 70 percent of them were in the 13 range sheep States.[4] From 1942, when 69 percent of the sheep shorn and 71 percent of the shorn wool produced were in these western range States, numbers of stock sheep in the native States and in the range States declined 50 and 45 percent, respectively, by 1950.

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[4] Range sheep States include the 11 Western States, Texas, and South Dakota. Native sheep States are all other States where sheep are produced, mainly under farm conditions.

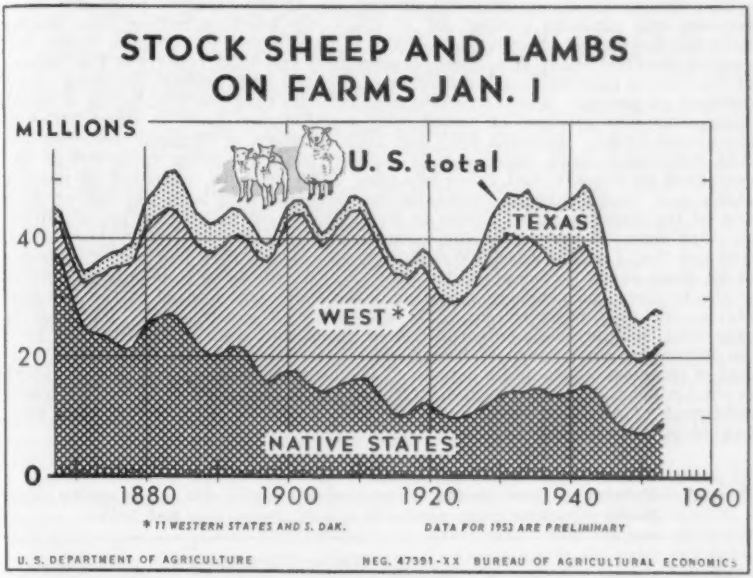


TABLE 1.—*Wool production, United States, selected years 1900 to 1939, annual 1940 to 1952*

[In million pounds]

| Year | Shorn wool | | Pulled wool | | All wool, scoured basis [1] |
|---|---|---|---|---|---|
| | Grease basis | Scoured basis [1] | As pulled | Scoured basis [1] | |
| 1900 | 260 | 114 | 29 | 22 | 136 |
| 1909 | 310 | 136 | 41 | 31 | 167 |
| 1923 | 230 | 101 | 42 | 32 | 133 |
| 1934 | 369 | 162 | 60 | 46 | 208 |
| 1937 | 356 | 156 | 66 | 50 | 206 |
| 1939 | 362 | 159 | 64 | 49 | 208 |
| 1940 | 372 | 164 | 62 | 46 | 210 |
| 1941 | 388 | 171 | 66 | 49 | 220 |
| 1942 | 388 | 171 | 67 | 50 | 221 |
| 1943 | 379 | 167 | 65 | 49 | 216 |
| 1944 | 338 | 149 | 73 | 55 | 204 |
| 1945 | 308 | 135 | 70 | 53 | 188 |
| 1946 | 281 | 124 | 61 | 46 | 170 |
| 1947 | 251 | 111 | 57 | 42 | 153 |
| 1948 | 232 | 102 | 47 | 35 | 137 |
| 1949 | 213 | 93 | 36 | 27 | 120 |
| 1950 | 215 | 95 | 32 | 24 | 119 |
| 1951 | 226 | 99 | 26 | 20 | 119 |
| 1952 | 232 | 102 | 34 | 25 | 127 |
| 1953 [2] | 229 | 101 | | | |

[1] Rough approximation based on estimated average yield of 44 percent for shorn wool and 75 percent for pulled wool. These yields were determined in an analysis of the 1946 domestic clip. It should be recognized that yields (shrinkage) vary from year to year and over a period of time with areas, weather conditions, breed and other factors.

[2] Preliminary.

Source: Bureau of Agricultural Economics.

The decline in sheep numbers during the 1940's resulted primarily from farmers and ranchers getting out of the sheep business rather than merely reducing the size of their flocks. Whereas the number of sheep on farms and ranches declined about 42 percent between 1940 and 1950, reports of the Bureau of the Census indicate that the number of farmers and ranchers reporting sheep declined 46 percent. Census reports also indicate that the liquidation of sheep enterprises was greatest on farms with small flocks, most of which were in the native States. Between 1939 and 1949, numbers of farmers reporting less than 300 sheep shorn decreased 43 percent, those reporting from 300 to 999 decreased 39 percent, and those reporting 1,000 or more decreased 32 percent (table 2). These changes emphasize the importance of both the size of flock and of the western range States in appraising wool production potentialities. By 1949 some 90 percent of the farmers and ranchers reporting sheep shorn still had flocks of less than 100 each, but as a group they had only 26 percent of all sheep shorn. (See appendix, table 2). At the same time only 20 percent of the farmers and ranchers reporting sheep shorn was located in the 13 range States, but they reported some 71 percent of all sheep shorn. Particularly important in appraising potentialities of sheep and wool production has been the increasing importance of Texas since the mid-twenties. Whereas 11 percent of the stock sheep and 9 percent of hte breeding ewes (1 year old or older) in the United States were located in Texas in the period 1924–26, by 1950 about one-fourth of all stock sheep and more than a fifth of all breeding ewes were located in that one State.

TABLE 2.—*Number of farms in the 13 range sheep States and in the native sheep States reporting sheep shorn, by size of flocks, 1939 and 1949*

| Number of sheep shorn per farm | Number of farms reporting | | | | | |
|---|---|---|---|---|---|---|
| | 13 range sheep States | | Native sheep States | | United States | |
| | 1939 | 1949 | 1939 | 1949 | 1939 | 1949 |
| | *Number* | *Number* | *Number* | *Number* | *Number* | *Number* |
| Less than 300 | 79,131 | 48,853 | 406,347 | 226,270 | 485,478 | 275,123 |
| 300 to 999 | 8,770 | 5,323 | 1,618 | 958 | 10,388 | 6,281 |
| 1,000 or more | 5,898 | 3,993 | 200 | 137 | 6,098 | 4,130 |
| All farms | 93,799 | 58,169 | 408,165 | 227,365 | 501,964 | 285,534 |

Source: Bureau of the Census, 1950.

An increasing proportion of sheep in the range States together with improved breeding have resulted in a 20 percent increase in fleece weights since 1909, the first year of record. (See appendix table 3.) Fleece weights in the 11 Western States are averaging about 9 pounds each, or about one-fourth more than in the period 1909 to 1913. Fleece weights in the native States are averaging about 7.5 pounds each or some 16 percent more than in 1909–13.

Data on trends in the quality and grades of wool are not available but an analysis of the 1946 clip indicates that about 52.5 percent of that clip was classed as Fine; 15.8 percent, ½ blood; 15.5 percent, ⅜ blood; 9.9 percent ¼ blood; 0.9 percent, Low ¼ blood; 0.3 percent, Common and braid; and 5.1 percent, Off wools. Percentages of the 1946 classed as Fine generally were substantially higher in the western range States than in the native sheep States. They were highest in the Southwest where they ranged as high as 95 percent in Texas, and they averaged nearly 69 percent in the 13 range sheep States compared with an average of only 19 percent in the native sheep States.[5]

Another important aspect of the shift in the location of sheep has been its effect on the size of the lamb crop, I. e., the number of lambs saved per 100 ewes in the breeding flock. The percentage lamb crop for the United States during the 10-year period 1942–51 was essentially the same as in 1924–30 (86.3 compared with 86.2) because an increase in most States in the number of lambs saved per 100 ewes was offset by an increasing proportion of the breeding flocks in Texas

[5] For an analysis of the 1946 clip see the Domestic Wool Clip, Grades, Shrinkages, and Related Data, U. S. Department of Agriculture, June 1951.

and the other range States where lamb crops are substantially lower than in the native States. During that period numbers of lambs saved per 100 ewes in the native sheep States increased from 99 to 100. It decreased from 72 to 68 in Texas where drought has prevailed in recent years, while in the 12 other range sheep States it increased from 81 to 86.

A significant trend which has an important bearing on potentialities of the domestic sheep and wool industry is the increasing emphasis on, and the increasing proportion of farmers' and ranchers' income from lamb and mutton rather than from wool. In the early days of the domestic sheep industry, sheep were raised primarily for their wool. Prior to 1920 the sale of shorn wool was providing some 40 to 50 percent of farmers' and ranchers' gross income from sheep. (See appendix table 4.) But the portion of their gross receipts from shorn wool has gradually decreased to a point where, in 4 out of the last 6 years, less than 30 percent of their gross income has been from the sale of shorn wool. The relative importance of wool as a source of income varies of course with type of operation and section of the country. It is more important with range lambing than with shed lambing, and it is more important generally in the range States than in the native States. Also a portion of the income from lamb and sheep sales is derived from the value of pulled wool but in recent years this has been the equivalent of only 7 or 8 percent of the farmers' and ranchers' gross income from sheep. But even in the Western States where the emphasis on wool production generally is greater than in the native States, from 65 to more than 70 percent of family operated sheep ranchers' total cash receipts from their sheep enterprise is provided by lamb and sheep sales.

Despite the decreasing share of growers' total cash receipts from wool, the price of wool remains a significant factor in determining the profitableness and, hence, the level of sheep and wool production. Net income on sheep ranches is relatively low compared with alternative enterprises. The margin of income over expenses is so close that a difference of a few cents in the price per pound of either lamb or wool may determine whether the operator makes a profit or loss.

### CAUSES OF THE DECLINE IN PRODUCTION

A number of interrelated factors combined to induce the unprecedented decline in the production of sheep and wool from 1942 to 1950.[8] The most significant of these were:

1. A scarcity of competent labor in an industry which is exceptionally dependent upon an adequate supply of specialized labor.
2. Relatively low returns, high costs, and high risks with sheep compared with cattle.
3. Inability to increase the efficiency of production at a rate comparable to other agricultural enterprises.
4. Uncertainties as to the future arising from adverse price-cost relationships, the constant threat of imports and possible tariff reductions, and the possibility of reductions in grazing allotments.
5. Losses from dogs and predatory animals at a time when competent help for protection against these hazards has been both scarce and expensive.
6. Drought in some areas, especially the Southwest.

Most of these unfavorable factors are still operative although in varying degrees compared with 1942 when the decline in production began.

The scarcity and high cost of competent hired labor were the most significant immediate impacts of World War II on the sheep industry. In the Western States where even family-operated sheep ranches were dependent on hired labor for a half of their total labor force, and where unskilled herders can cause large investment losses in a matter of hours, skilled herders became almost nonexistent. Wage rates for the less skilled labor that was available increased. And the supply of family labor declined with the loss to the Armed Forces and defense industries. Prices of sheep remained relatively favorable for a time (see appendix table 5) and sheep operators who were in a position to do so began to liquidate their flocks and shift to cattle, a type of production which is much less dependent upon hired labor.

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[8] Earlier analyses of the decline in domestic sheep and wool production may be found in Increasing Domestic Wool Production, S. Doc. 100, 82d Cong., 2d sess., February 5, 1952; and in Domestic Wool Requirements and Sources of Supply, U. S. Department of Agriculture, June 1950.

In the native or farm flock States many of the same factors were at work although their impact was slightly different than in the range States. In the native States most flocks had less than 100 head. They were minor farm enterprises which had been established largely to utilize unpaid family labor, feed resources not readily utilized by other livestock, and to augment the relatively low farm incomes of the 1930's. The scarcity and high cost of hired labor, the dwindling supply of family labor, increasing losses caused by dogs and other predators which were more difficult to control with less labor, and the favorable incomes received from the major farm enterprises, induced many farmers to liquidate their sheep enterprise at the relatively favorable lamb and ewe prices which still prevailed in 1942. They simply did not want to be bothered with sheep at a time when incomes were favorable and labor was scarce.

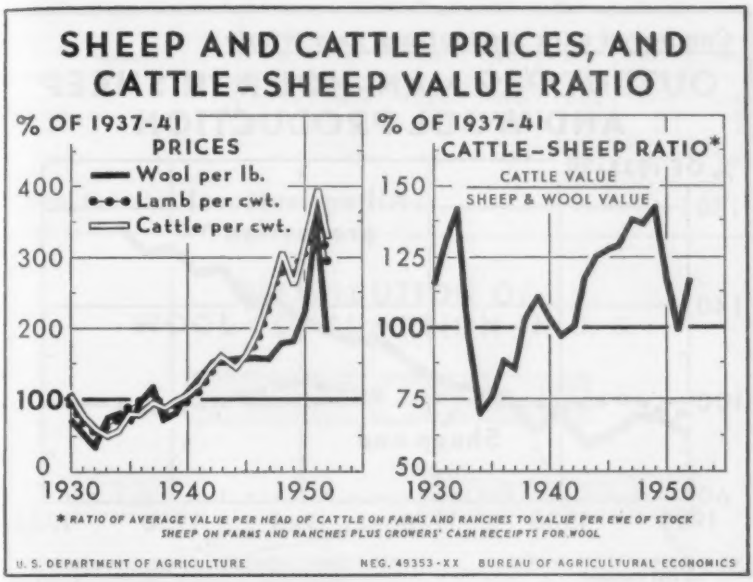
In the succeeding years the relatively low returns from sheep compared with cattle doubtless were the dominant reason for the continuing decline in sheep numbers (fig. 2). Relatively stable wool prices in a period when cattle prices were increasing rapidly, increasing production costs, continued scarcity and high cost of labor, inability to increase the efficiency of production and thus lower production costs, and increasing competition from synthetic and other fibers, all contributed to the sheep operators' relatively low net incomes. Uncertainties as to the prospective impacts on the domestic sheep industry of foreign supplies and domestic stocks of wool and tariff reductions such as those of 1948 contributed to the sheep operators' decisions to shift to cattle or to get out of the ranching business. As the sheep operators in some of the Western States left the ranching business they were not always replaced—not only because of the unfavorable income position of sheep production but also because the Federal land management agencies used such opportunities to reduce numbers of animals permitted on the Federal ranges in their efforts to bring rates of stocking more nearly in line with estimated sustained carrying capacities, with a minimum inconvenience or loss to ranchers. The fact that grazing allotments of other operators also have been reduced in the move to bring rates of stocking in line with carrying capacities has created an uncertainty in the minds of some ranchers as to their security of tenure on Federal grazing lands.[7]

Since 1943 the net ranch income of one-band sheep ranches in the Intermountain region has been less than that of family-operated cattle ranches in every year except 1950 and 1951. (See appendix table 6.) Percentage returns on investment were higher on cattle ranches in 5 out of 6 years from 1944 to 1949. The hired labor bill on these sheep ranches increased from about 1,700 in 1942 to nearly 5,500 in 1952, while the labor bill on the cattle ranches was increasing from little more than $100 to less than $560. (See appendix table 7.) A similar though less marked situation has prevailed on family-operated sheep and cattle ranches in the northern Great Plains where many of the sheep are under fence and ranchers are less dependent on hired labor. There the net returns on family-operated sheep ranches generally have exceeded that on family-operated cattle ranches, but their investments have been substantially larger.

Favorable lamb and wool prices in 1950 and 1951 returned sheep operators to a favorable income position in those years. As a consequence, numbers of sheep were increased slightly in those years except in Texas and Oklahoma where a further reduction was made in sheep numbers because of continued drought. The drastic decline in wool and lamb prices since 1951 has again placed sheep and wool production at a disadvantage. This, together with the effects of abnormal drought in the Southwest, is expected to bring a reduction in sheep numbers again in 1953.

While there are limitations to the extent that sheep ranchers can increase their efficiency of production, some have been able to do so. Many others have not. They are operating at about the same level of efficiency as in the predrought period 1930–33, and at a slightly lower level than in 1939–42. (See appendix table 8.) Technological advances which have increased the efficiency of crop farmers and of livestock farmers who are dependent primarily on harvested feeds, have not been effective in the semiarid range areas of the West (fig. 3). Cattle ranchers have not been significantly different than sheep

[7] See Domestic Wool Requirements and Sources of Supply, U. S. Department of Agriculture, June 1950, for a summary of reasons given by farmers and ranchers for reducing sheep numbers.

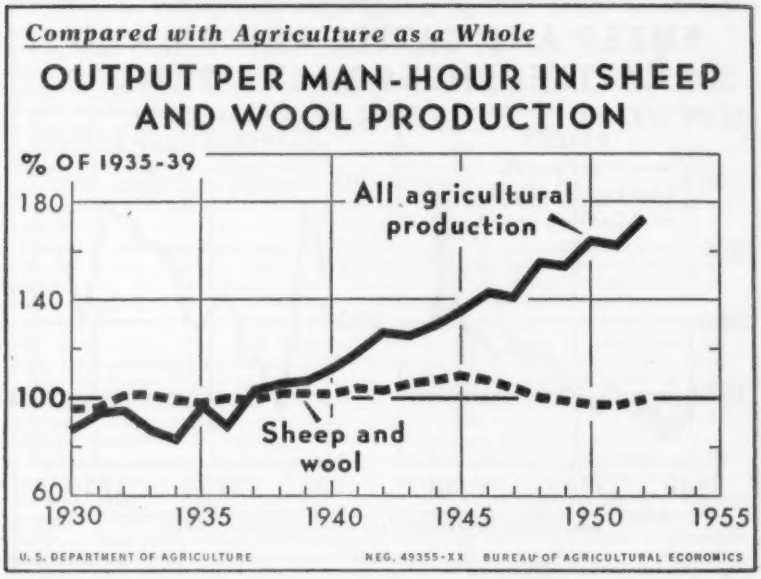



ranchers in this respect, but favorable cattle prices have maintained their favorable competitive position.

The balance between forage supplies and numbers of forage-consuming units of livestock also is a factor which contributed to the decline in numbers of sheep. It may be an even more important factor in any effort to increase the level of sheep and wool production. Numbers of roughage-consuming animal units were at record levels in 1943–44 in both the range and the native sheep States. (See appendix table 9.) A decline in cattle numbers, together with the continuing decline in sheep numbers and poor range conditions in local areas resulted in gradual reduction in numbers of roughage consuming animal units from 1944 through 1948. Largely due to the continuing increase in cattle numbers, numbers of roughage consuming animal units have been increasing since 1948. They have not yet achieved former levels but, with the exception of the drought area of the Southwest, they are approaching a level which might be considered to be in balance with the sustained carrying capacity of pastures and ranges.

Cattle numbers are reaching the peak of their cycle and, if the usual cyclical pattern is followed, they may be expected to decline over the next several years. Horses and mules will likely continue their trends downward. With these changes in prospect, the country has the range and forage resources for an increase in sheep production.

Another causal factor has been the decline of the frontier and the pressure of civilization on the sheep industry. Ranchers still compete with foreign wool produced under lower cost conditions, while their production costs have been increased by competition from industry and military establishments for land, labor, and other production factors.




Increasing competition from synthetic fibers, which also contributed to the declining competitive position of wool, and the tariff, which from the point of view of the individual producer has been a matter of uncertainty, are discussed later in this report.

### TRENDS IN CONSUMPTION OF APPAREL WOOL

About two-thirds of all wool consumed in the United States is apparel wool (fig. 4). Mill use of apparel wool in the United States has declined sharply from the record level of 1946, when consumption was more than double the prewar (1935–39) average. Practically all of the apparel wool used in 1946, as in 1935–39, was for civilian goods.

Consumption during 1949–52 averaged almost one-third lower than during 1946–48 but about one-third above 1935–39. An increase in the quantity of wool used for military items, however, accounted for three-fourths of the increase over 1935–39; total civilian usage during 1949–52 was only one-tenth above prewar, about half the increase in population.

The decline since the end of World War II has been somewhat greater for 60's and finer wool than for the coarser wools (table 3 and appendix table 10). Likewise, consumption on the worsted system of manufacture has declined somewhat more than on the woolen system (table 4 and appendix table 11).

TABLE 3.—*Percentage distribution of apparel wool consumption by grades, United States, 1946 to 1952*

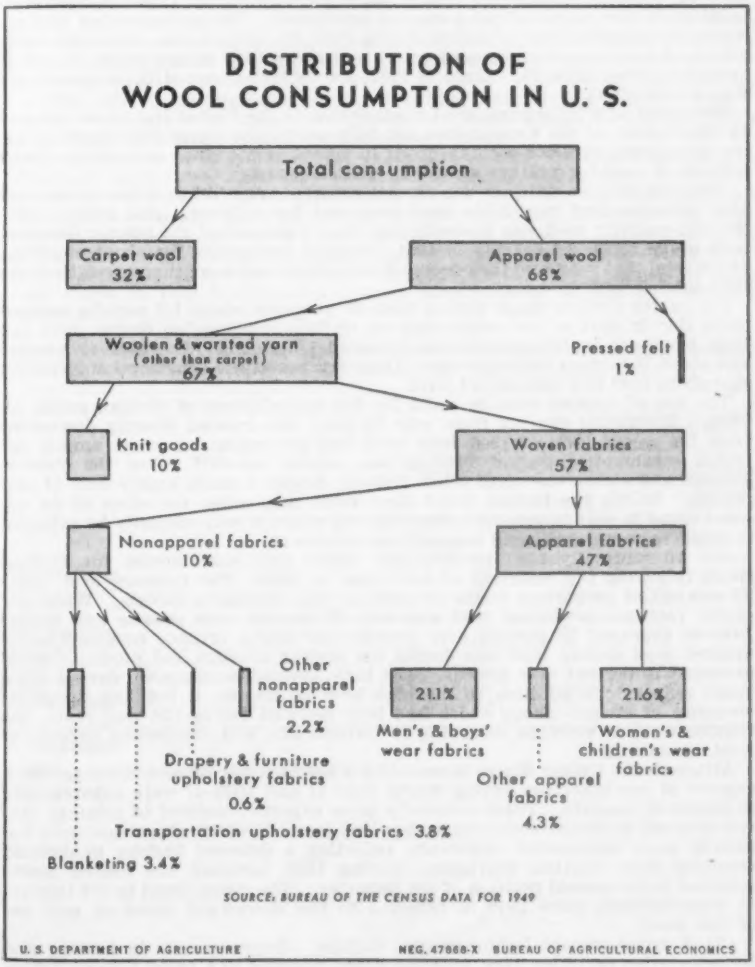
| Grades | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 |
|---|---|---|---|---|---|---|---|
| | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* |
| 60's and finer | 54.9 | 62.2 | 62.6 | 54.6 | 56.3 | 58.5 | 51.2 |
| 50's up to 60's | 31.2 | 25.6 | 26.9 | 35.4 | 34.5 | 32.8 | 35.8 |
| 48's and coarser | 13.9 | 12.2 | 10.5 | 10.0 | 9.2 | 8.7 | 13.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Derived from reports of the Bureau of the Census.

TABLE 4.—*Percentage distribution of apparel wool consumption on woolen and worsted systems, United States, 1946 to 1952*

| System | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 |
|---|---|---|---|---|---|---|---|
| | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* | *Percent* |
| Worsted | 56.9 | 64.0 | 65.8 | 59.1 | 67.3 | 58.9 | 53.9 |
| Woolen | 43.1 | 36.0 | 34.2 | 40.9 | 32.7 | 41.1 | 46.1 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Derived from reports of the Bureau of the Census.



Although these proportions have shown a net downward trend during the postwar period, they have varied considerably from year to year, reflecting short-term fluctuations in demand for the various end items and in price differentials between grades and staples.

Whereas domestic production was equivalent to about four-fifths of total consumption during 1935–39, it was equivalent to only about one-third of the quantity consumed during 1949–52. (See appendix table 12.) The lower ratio in recent years reflects the sharply lower production, increased imports, and the higher rate of consumption relative to 1935–39.

Although the total quantity of domestic wool consumed during the last 10 years was about equal to the quantity produced, domestic wool did not move into manufacturing channels each year as produced. During 1944–46, a large part of domestic production accumulated as Commodity Credit Corporation holdings in the course of price-support operations. The accumulation was absorbed in manufacturing channels during 1947–50, when prices of foreign wools advanced to levels above support prices and above CCC selling prices for wools acquired during 1944–46. Again in 1952, a substantial part of the domestic clip was sold to CCC.

The trend of total apparel wool consumption in the United States as reported by the Bureau of the Census does not fully reveal the sharp downtrend in the use of apparel wool for civilian goods in recent years, since the total includes mill use of wool for military as well as civilian goods.

Although data on military use are not reported, such information as is available indicates that very little wool was used for military items during 1946–50—the quantity used was probably less than 5 percent of the total. However, such usage increased sharply in 1951, probably accounting for about two-fifths of the total that year, and then declined to probably not more than one-fifth of the 1952 total.

Per capita civilian usage during 1942–45 averaged about 1.8 pounds, scoured basis, due in part to the restrictions on civilian consumption during 1942 and 1943, when per capita consumption averaged 1.3 pounds. The 1942–45 average was about 15 percent below prewar. However, per capita consumption increased sharply in 1946 to a new record level.

The use of apparel wool by mills for the manufacture of civilian goods, although fluctuating sharply from year to year, has trended sharply downward from the record level of 1946, both total and per capita. Average annual per capita consumption during 1949–52 was almost one-half below the 1946–48 average and almost one-tenth below 1935–39, despite a much higher level of real income. Among the factors which have more than offset the effect of an upward trend in real income and other factors which would normally be expected to result in an upward trend in consumption were:

(1) An unusually high level of per capita mill consumption for civilian goods following the cessation of hostilities in 1945. The increase over 1935–39 was out of proportion to the increase in real disposable income. While per capita real income during 1946 was only 57 percent over prewar and during 1946–48 averaged 50 percent over prewar, per capita civilian consumption of apparel wool during 1946 was double the prewar average and during 1946–48 averaged 70 percent over prewar. The high level of consumption during those years reflected, in addition to the high level of income, a building up of inventories of civilian goods which had been reduced during the war years, the requirements of veterans returning to civilian life, and substantial exports of wool manufactures.

Although the United States is normally a net importer of wool manufactures, exports of manufactures during World War II and 1946–47 were substantially in excess of imports. These unusually large exports consisted of military fabrics shipped to Allied countries under lend-lease, UNRRA shipments, and unusually large commercial shipments, reflecting a deferred backlog of demand resulting from wartime shortages. During 1948, however, the United States returned to its normal position of net importer. The rising trend in net imports of manufactures since 1948 is reflected in the downward trend of mill use of raw wool.

(2) A trend toward lighter-weight clothing. Improvements in heating and transportation facilities have, over the years, resulted in a trend toward lighter clothing in the Untied States, a trend which has continued in the post-World War II period a an accelerated rate.

(3) Increased competition from budgetary items other than clothing for the consumer's dollar. Although both per capita real disposable income and ex-

penditures during 1949–52 were about double pre-World War II, per capita real expenditure for clothing was up less than one-third. The proportion of total expenditure spent for clothing which averaged 8.4 percent during 1935–39 and 8.5 percent in 1946–48, declined sharply to only 7.4 percent during 1949–52 (table 5).

(4) Increased competition from other fibers, particularly manmade fibers. (See appendix tables 13 to 15.) While per capita consumption of apparel wool declined from an average of 3.7 pounds, scoured basis, during 1946–48 to only 2.4 pounds during 1949–52, per capita use of manmade staple fiber increased from 1.8 to 2.4 pounds between the two periods (table 6). The increase in the total use of manmade staple fiber reflects in part the sharp increase in the use of such fiber in items, particularly apparel, for which wool traditionally has been considered the most desirable fiber. (See appendix tables 16 to 19.) The greatly improved quality and relatively lower prices of these fibers are among the major factors which have encouraged their use in these areas. While wool prices during 1949–52 averaged about 50 percent higher than during 1946–48, and more than double pre-World War II, prices of viscose staple were up only one-fifth relative to 1946–48 and only one-third relative to pre-World War II (table 7 and appendix table 20). Prices of acetate staple fiber since World War II have averaged about 15 percent below 1935–39.

Of the manmade fiber, rayon and acetate have been the major competitors. However, several new fibers have been introduced in recent years, and others are being developed. The manufacturers of both these and the older manmade fibers are continually striving to improve their product. Their present plans call for increases in production capacity for rayon staple of almost two-thirds, of acetate staple of about one-eighth, and of noncellulosic staple of almost 3.5 times estimated 1952 capacities by October 1954 (table 8). Output of cellulosic staple in 1952 is estimated to have been between 80 and 85 percent of capacity.

TABLE 5.—*Expenditure for clothing related to disposable income and consumer personal expenditure, United States, average 1935–39, annual 1946 to 1952*

| Year | Disposable income per person | Consumer personal expenditure per person | Expenditure for clothing as percent of— | |
|---|---|---|---|---|
| | | | Disposable income | Consumer personal expenditure |
| | *1935–39 dollars* | *1935–39 dollars* | *Percent* | *Percent* |
| 1935–39 average | 506 | 486 | 8.09 | 8.42 |
| 1946 | 794 | 734 | 8.37 | 9.07 |
| 1947 | 727 | 710 | 8.04 | 8.25 |
| 1948 | 737 | 696 | 7.76 | 8.24 |
| 1946–48 average | 752 | 713 | 8.06 | 8.52 |
| 1949 | 727 | 701 | 7.56 | 7.84 |
| 1950 | 777 | 735 | 6.95 | 7.35 |
| 1951 | 775 | 716 | 6.68 | 7.23 |
| 1952 [1] | 778 | 718 | 6.78 | 7.34 |
| 1949–52 average [1] | 764 | 718 | 6.99 | 7.44 |

[1] Preliminary.

Source: Derived from data of U. S. Department of Commerce.

TABLE 6.—*Per capita consumption of wool and manmade staple fiber, United States, average 1935–39, annual 1946 to 1952*

| Year | Wool [1] | | | Manmade staple fiber | | |
|---|---|---|---|---|---|---|
| | Apparel | Carpet | Total | Cellulosic [3] | Noncellulosic [2] | Total |
| | *Pounds* | *Pounds* | *Pounds* | *Pounds* | *Pounds* | *Pounds* |
| 1935–39 average | 2.15 | 0.73 | 2.88 | 0.34 | ..... | 0.34 |
| 1946 | 4.25 | .89 | 5.14 | 1.46 | ..... | 1.46 |
| 1947 | 3.60 | 1.18 | 4.78 | 1.77 | ..... | 1.77 |
| 1948 | 3.26 | 1.40 | 4.66 | 2.04 | ..... | 2.04 |
| 1949 | 2.24 | 1.07 | 3.31 | 1.39 | 0.07 | 1.46 |
| 1950 | 2.84 | 1.29 | 4.13 | 2.57 | .15 | 2.72 |
| 1951 | 2.44 | .65 | 3.09 | 2.62 | .21 | 2.83 |
| 1952 | 2.18 | .75 | 2.93 | 2.32 | .30 | 2.62 |

[1] Scoured basis.
[2] Domestic shipments plus imports for consumption
[3] Domestic production.

Source: Derived from data of Bureau of the Census and Textile Economics Bureau.

TABLE 7.—*Indexes of prices of wool and manmade cellulosic staple fiber, United States, average 1935–39, annual 1946 to 1952*

| Year | Wool | | Cellulosic staple | |
|---|---|---|---|---|
| | Fine [1] | Medium [2] | Viscose [3] | Acetate [4] |
| 1935–39 average | 100 | 100 | 100 | 100 |
| 1946 | 110 | 124 | 90 | 74 |
| 1947 | 139 | 136 | 113 | 91 |
| 1948 | 200 | 163 | 129 | 91 |
| 1949 | 211 | 156 | 127 | 82 |
| 1950 | 242 | 197 | 128 | 81 |
| 1951 | 307 | 305 | 141 | 91 |
| 1952 | 189 | 167 | 140 | 81 |

[1] Australian 64's, 70's good topmaking, clean basis, duty-paid, Boston.
[2] Montevideo super 1's (56's), clean basis, duty-paid, Boston.
[3] 1½ denier.
[4] 5 denier.

Source: Derived from prices reported by Bureau of Labor Statistics, Textile Economics Bureau, and U. S. Department of Agriculture

TABLE 8.—*Production and capacity of manmade staple fiber in the United States, 1940 to 1952*

| Period | Cellulosic | | | Noncellulosic | Total |
|---|---|---|---|---|---|
| | Rayon | Acetate | Total | | |
| | Actual production | | | | |
| | *Million pounds* | *Million pounds* | *Million pounds* | *Million pounds* | *Million pounds* |
| 1940 | 71 | 10 | 81 | | 81 |
| 1941 | 105 | 17 | 122 | | 122 |
| 1942 | 128 | 26 | 154 | | 154 |
| 1943 | 130 | 32 | 162 | | 162 |
| 1944 | 129 | 40 | 169 | | 69 |
| 1945 | 129 | 39 | 168 | | 168 |
| 1946 | 133 | 44 | 177 | | 177 |
| 1947 | 168 | 60 | 228 | | 228 |
| 1948 | 184 | 84 | 268 | | 268 |
| 1949 | 130 | 65 | 195 | 10 | 205 |
| 1950 | 188 | 117 | 305 | 23 | 328 |
| 1951 | 207 | 129 | 336 | 33 | 369 |
| 1952 | 212 | 95 | 307 | 47 | 354 |
| | Forecast of annual capacity—as of— | | | | |
| March 1954 | 360 | 171 | 531 | 147 | 678 |
| October 1954 | 360 | 171 | 531 | 208 | 739 |

Source: From Textile Organon.

NOTE.—The extent to which such fibers will be used in the future in the manufacture of items for which wool traditionally has been considered the most desirable fiber is, of course, conjectural and will depend mainly upon relative prices and quality characteristics and consumer preference.

MARKETING, MANUFACTURING, AND DISTRIBUTION OF WOOL AND WOOL PRODUCTS

In terms of costs of services rendered, the marketing, manufacturing, and distribution phases of the domestic wool industry are about six times as large as the farm production phase (fig. 5). They average about 86 cents of the consumer's dollar spent for apparel and household goods made of wool compared with about 14 cents received for farm production of the domestic wool used. Nearly half of the marketing, manufacturing, and distribution costs are labor costs (fig. 6). Although progress has been made in recent years by operators in these segments of the industry, further improvements in the quality and efficiency of the services performed would contribute in an important way toward promoting a sound and prosperous domestic wool industry.

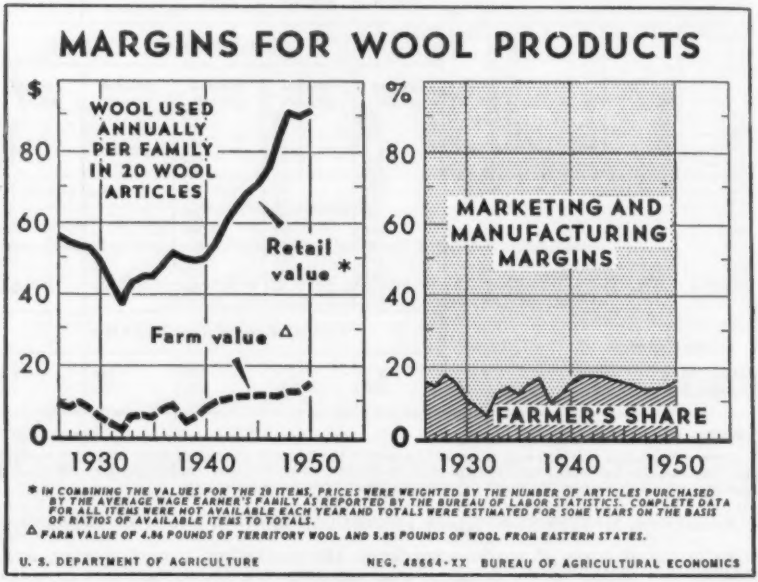
*Marketing raw wool*

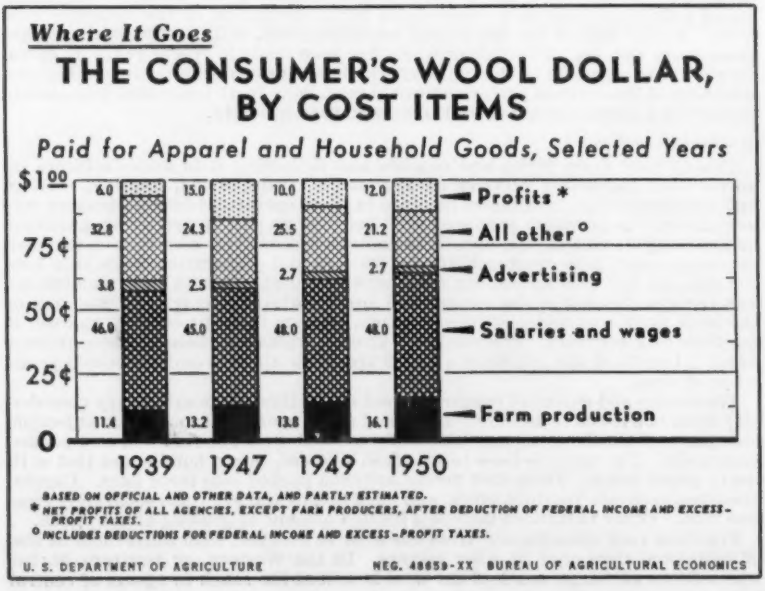
Taking wool from farms and ranches and delivering it to manufacturers involves such marketing services as assembling, transporting, grading, storing, and merchandising. Marketers involved in these operations include brokers who arrange for the purchase or sale of wool but take no part in preparing, handling, or financing it; commission agents, including cooperatives, who receive the wool on consignment, take responsibility for its care and preparation while it is held for sale, sell the wool and collect from buyers, deduct expenses and commissions, and remit settlement to the owner; and dealers who take outright possession of the wool, ship it to centers of consumption, prepare it for processors, and sell it for their own accounts. The combined gross margins for these services average about 2.4 cents of the consumer's dollar spent for apparel and household goods made of wool.

The nature and extent of preparing wool at the time of shearing vary considerably from one ranch to another. In typical ranch operations, only such objectionable parts of the fleece as tags and badly stained wool are removed and packed separately. The fleece is then rolled, flesh side out, into a bundle and tied with heavy paper twine. These tied fleeces are then packed into large bags. Careful operators separate yearling, black, and buck fleeces and bag them separately from ewe wool. Other variations include a limited amount of grading at the ranch.

Practices vary considerably from one area to another, with differences in size of individual clips, and in other factors. In the Western, or territory States, where flocks are large, much of the wool is sold at the ranch to agents of central

market dealers, particularly those in Boston. When possible, buyers inspect the clips at the shearing shed or warehouse during the shearing season as a basis for estimating shrinkage and quality, but when such inspection is not possible, the wool is examined in the barn, or is bought on the basis of knowledge of previous clips of the same producer. The wool usually is shipped to central markets for storage, preparation, processing, and manufacture.


MARGINS FOR WOOL PRODUCTS
$
80
60
40
20
0
WOOL USED ANNUALLY PER FAMILY IN 20 WOOL ARTICLES
Retail value *
Farm value △
1930
1940
1950
%
80
60
40
20
0
MARKETING AND MANUFACTURING MARGINS
FARMER'S SHARE
1930
1940
1950
* IN COMBINING THE VALUES FOR THE 20 ITEMS, PRICES WERE WEIGHTED BY THE NUMBER OF ARTICLES PURCHASED BY THE AVERAGE WAGE EARNER'S FAMILY AS REPORTED BY THE BUREAU OF LABOR STATISTICS. COMPLETE DATA FOR ALL ITEMS WERE NOT AVAILABLE EACH YEAR AND TOTALS WERE ESTIMATED FOR SOME YEARS ON THE BASIS OF RATIOS OF AVAILABLE ITEMS TO TOTALS.
△ FARM VALUE OF 4.96 POUNDS OF TERRITORY WOOL AND 5.85 POUNDS OF WOOL FROM EASTERN STATES.
U. S. DEPARTMENT OF AGRICULTURE
NEG. 48664-XX BUREAU OF AGRICULTURAL ECONOMICS



In Texas, a large part of the wool is shipped to warehouses for sale. These warehouses provide facilities for concentrating wool in volumes large enough for efficient handling, prepare the wool for storage and sale, display sample bags for the inspection of buyers, and grade some of the wool as a basis for sale by private treaty or sealed bids. Many warehouse operators buy small clips and a few operators buy large quantities of wool each year.

In the native, or fleece-wool States, where flocks are small, most of the wool is sold to country dealers who assemble the lots and either sell them to the larger merchants or store them in their own warehouses. Many merchants in the larger cities buy wool from country buyers and resell it to merchants in central markets. In many instances, the wool is ungraded, but in others it is roughly graded into three classes: Fine, medium, and rejects. Dealers in central markets send their agents to small towns or to farmer-owned warehouses to buy wool suitable to their needs. This wool is shipped to the larger concentration points, where it is graded and otherwise prepared on the basis of mill requirements and sold to manufacturers.

Substantial quantities of wool are marketed through cooperative market associations. The methods used in physical handling, showing, and selling wool through these associations are similar in most respects to those of other agencies.

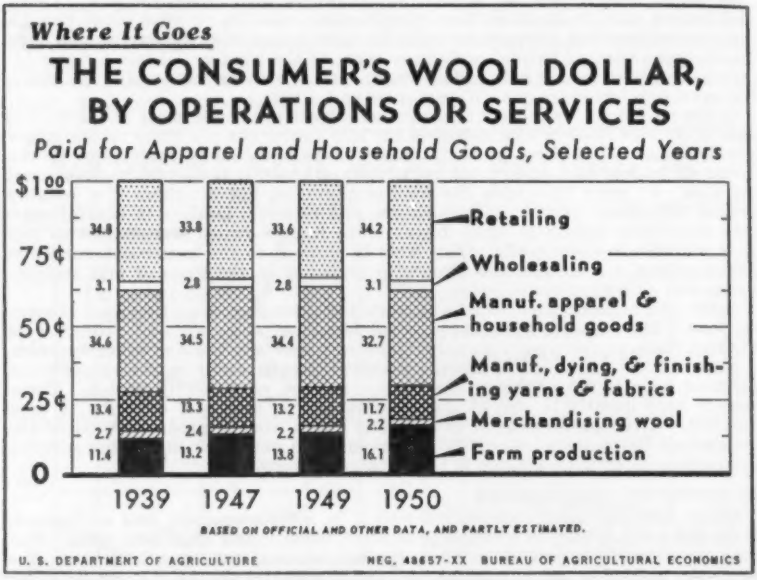
Many of the firms which provide preperation and other marketing services for wool operate in or through the central market, particularly Boston. These dealers vary greatly in size of organization and in kind and quantity of wool handled. Although 85 percent of domestic shorn wool is produced west of the Mississippi River, a major part of the preparation and other marketing services are performed by firms located in the vicinity of Boston.

*Processing and manufacturing*

When domestic wool reaches the mill it is sorted, scoured, and carbonized, if necesary; that used in woolens is blended, carded, and spun into yarns; that used in worsteds is carded, combed, made into tops, and spun into yarn; the yarns are knitted or woven into fabrics; and the fabrics are put through finishing processes before they are ready for fabricators of apparel and household goods and for industrial uses. The relative importance of these operations, from the viewpoint of cost, is indicated by the gross margins per pound of wool which, for these operations, average almost as much as total returns to growers for farm production of the wool and about five times as much as total costs of marketing the raw wool (fig. 7).

Wool manufacturers' gross margins in 1947 averaged about 47 percent of the value of the products for all manufacturers combined and ranged from about 38 percent for scouring and combing plants to about 49 percent for manufacturers of woolen and worsted fabrics. In 1949 and 1950, these proportions were less than in 1947. The proportions of gross margins of manufacturers that were accounted for by wages and salaries decreased from 57 percent in 1939 to less than 50 percent in the early 1950's.

The competitive position of poorly prepared wool has been weakened in recent years as a result of technological and other developments in the wool manufacturing industry. These developments were associated with large increases in wage rates and the development of more automatic machinery for use in reducing labor costs. Manufacturers tend to increase their discrimination against wool that requires much labor in preparation and to increase their preference for wool and other fibers that are uniform enough to meet the requirements of the more automatic machinery and improved methods.




Although machinery and equipment used by manufacturers of woolens and worsteds have been improved in recent years, further improvements are needed. Numbers of French combs, worsted spinning spindles of the American system, and automatic looms have increased, whereas numbers of other kinds of machinery have decreased in recent years. During World War II, much of the machinery in use was overworked and replacements of badly worn and obsolete machinery and equipment with new and improved types were delayed by shortages. But in more recent years, substantial improvements have been made. Census reports show that expenditures for new plants and equipment by manufacturers of woolens and worsteds increased from $9,307,000 in 1939 to $50,009,000 in 1947 and totaled $32,836,000 in 1952. Of the total expenditure in 1952, about $27,750,000 was for new machinery and equipment.

Growth of the rayon industry, together with developments in cotton manufacturing machinery, stimulated a minor revolution in the manufacturing industry for textile machinery after World War II. An outgrowth of the developments was the introduction of the "American system" of worsted manufacture, which combines a short-cut method of preparing the top for spinning and an improved spinning frame. As a result, the number of stages in the drafting and roving operations are greatly reduced, the machines can be run at higher speed, and yarns can be produced at lower cost, particularly for labor. Improvements have also been made in other machinery used in spinning and weaving on both the woolen and worsted systems.

The principal advantages of the new machines are reduced labor requirements, wider range of staples that can be used, and the ability to shift readily from one type of fiber to another. But to operate efficiently, these high-speed machines require a highly uniform fiber stock. If the stock is not uniform, breaks occur in the roving or yarn at high speeds and the machines stop. Cost of the labor attending the machines then become high. Under these circumstances, manufacturers can afford to pay premiums for highly uniform fibers and they tend to discount poorly prepared wool more heavily.

The importance of reducing labor costs by use of improved machinery or by other means may be indicated by the data showing that wages accounted for about 43 percent of gross operating margins for manufacturers of woolens and worsteds in 1947 and that average hourly wage rates of workers in the woolen and worsted manufacturing industry increased from 53 cents in 1939 to $1.55 in

1952. Most of the wool-manufacturing industry is in New England and the Middle Atlantic States where labor costs are relatively high, although in recent years the manufacture of wool in the South, where labor costs are relatively low, has increased considerably. The proportion of total number of woolen and worsted spindles in place that were located in the South increased from 5 percent in 1939 to 8 percent in 1949. The corresponding portion for woolen and worsted looms in place increased from 6 percent in 1939 to more than 12 percent in 1949.

*Fabrication of apparel and household goods*

The great importance of the fabrication of apparel and household textiles, from the viewpoint of cost, is indicated by the gross margins for fabricating these products which average about 2:5 times as much as gross returns to growers for farm production of the wool used, more than 14 times as much as gross margins for marketing raw wool, more than 2.6 times as much as gross margins for manufacturing and finishing the yarns and fabrics used, and almost as much as gross margins for wholesale and retail distribution of the products. An analysis by the Wool Bureau of the division of the consumer's dollar paid for a man's two-piece worsted suit, at the moderate price of $50 during the 1949–50 season, shows that about 10.9 percent was accounted for by the costs of the cleaned wool required, 16.9 percent by costs of manufacturing the fabric, 32.2 percent by costs of making the garment, and 40 percent by retail distribution.

Fabricators of textile products range from large companies operating several establishments to small family shops. A large proportion of the establishments are located in the Middle Atlantic States and most of them are operated as single units under corporate or partnership ownership and control. Methods employed in fabricating textile products vary with the nature of the products. The processes involved usually include cutting the garment parts from purchased yard goods, sewing or joining the parts into the completed garment, folding and pressing, and boxing the products for shipment. Fully integrated plants usually are organized into four departments on the basis of these processes or functions.

Spreading, cutting and sewing machines and supplementary facilities make up the basic equipment used in the manufacture of apparel. In recent years, spreading machines have been more widely employed and the trend toward the increased use of electrical knife cutting and the replacement of some types of hand cutting by the use of dye or clicker cutting for small pieces have been continued. Overhead rails have been more generally employed over the cutting tables to increase the flexibility of the cutting machines and to permit the use of more cutting machines at the same time.

No revolutionary changes in machinery and equipment in the sewing department have occurred within recent years. But a number of mechanical improvements have been widely adopted throughout the industry. Use of self-oiling, high-speed sewing machines capable of running up to 5,000 revolutions per minute has increased and the use of double-needle machines has been extended. Automatic or manually controlled thread cutting and clipping machines have been used in many cases as replacements for the cruder methods of cutting thread. Special guides attachments have been widely introduced throughout the industry to simplify and speed up the sewing operations. Turning and folding machines have been improved, use of automatic ruffling machines has been increased, and the practice of using buttonhole sewing machines in tandem has become more general in recent years. Other improvements which have been expanded include the use of glass table tops with fluorescent lighting underneath to facilitate inspection, the more frequent use of chutes and bins to improve work and reduce handling, improvements in interior lighting to eliminate shadows, and provision of more electrical outlets to make more flexible the arrangement of machines. Total expenditures for plants and equipment by these manufacturers increased from about $14 million in 1939 to more than $80 million in 1947 and amounted to $69,309,000 in 1951. Expenditures for new machinery and equipment totaled $39,792,000 in 1949 and $50,792,000 in 1951.

Wages and salaries, particularly by manufacturers of apparel and other finished textile products, average more than half of the gross operating margin and more than a fourth of the gross sales of these manufacturers. Average hourly earnings of wage workers in the apparel and other finished-textile products industry have more than doubled since 1939. These facts emphasize the importance of making full use of technological developments and of improvements in organization and operation in increasing the efficiency and in reducing the costs, particularly of labor, of fabricating apparel and household textiles.

*Wholesale and retail distribution*

Distribution of wool products includes the wholesaling of intermediate products, such as yarns and fabrics, mainly to manufacturers, as well as the wholesaling and retailing of finished products to ultimate consumers. The relative importance of the distribution services, from the viewpoint of cost, is indicated by gross margins for wholesale and retail distribution of wool products which average about 2.7 times gross returns to growers for farm production of the wool used, almost 3 times the gross margins for manufacturing and finishing the yarns and fabrics, and about 9 percent more than gross margins of fabricators of the apparel and household textiles made of wool.

Large proportions of intermediate textile products are distributed directly from manufacturers to converters, fabricators, and industrial users, although substantial proportions are handled by wholesalers and jobbers. Most of the finished textile products flow directly from manufacturers, or indirectly through a number of different combinations of agencies, to consumers. An important channel of distribution, particularly in earlier years, was from manufacturers to wholesalers to retailers to consumers. But in more recent years, the services of manufacturing and distributing textile products have been integrated to a considerable extent. Price and production regulations during World War II apparently favored the extension of unified control, and integrations in the textile industry apparently reached new high rates during the late 1940's.

Wholesalers include a number of different types and sizes of operators. They supply a ready market outlet to manufacturers for products in rather large volume and relieve manufacturers of making the many contacts necessary to sell directly to retailers. The large-lot purchases made by wholesalers and the assembly services they perform make possible reductions in transportation costs by permitting large-lot shipments over long distances. Wholesalers reduce storage costs and credit risks of manufacturers by advanced buying. They help finance manufacturers by advancing funds and they relieve them of some financial risks which arise in dealing with retailers, whose rate of failure is relatively high.

Wholesalers also perform important services for retailers. The assembly services rendered enable retailers to obtain their supplies from relatively few sources. The readily available supplies made available by wholesalers to retailers enable them to reduce their overhead costs by the use of small stocks and more rapid turnover. Total costs of storage are reduced because large-scale storage in wholesalers' warehouses is cheaper than storage on the relatively high-rent shelves of retailers. In addition, wholesalers provide credit and other services to retailers.

Gross margins for wholesale dry-goods houses increased from an average of about 16 percent of net sales in 1939 to 18.7 percent in 1943, decreased to 15.4 percent in 1949 and averaged 16.3 percent in 1952. Census reports for 1948 indicate that operating expenses of wholesalers of finished textile goods averaged 11.6 percent of net sales for merchant wholesalers, 5.8 percent for manufacturers' sales branches, 5.6 percent for manufacturers' sales offices, and 3.1 percent for agents and brokers. Expenses per dollar of sale usually average less for wholesalers with large than for those with small volumes of sales. Profits of wholesale dry-goods houses increased from less than 2 percent of net sales in 1939 to 7 percent in 1943 and averaged about 2.3 percent in 1952, before deductions for Federal income taxes.

Retailers include a number of different types and sizes of operators. They represent the final stage in the movement of textile products from farm producers to ultimate consumers. They assemble the products primarily for the benefit of consumers by bringing together, at places convenient to them, various stocks of goods which satisfy the needs and tastes of the customer. Retailers also collect and pass back to wholesalers and to manufacturers information as to the demands of consumers for use as a guide to further production. Retailers perform some of the services of storage, as well as some of the risks involved in holding goods until they are needed by consumers, and extend credit to consumers. In addition, they render delivery and other services to consumers.

Retailers' gross margins, as indicated by data for department stores, increased from about 33 percent of net sales in 1932 to about 38 percent during World War II, and decreased to less than 36 percent in the early 1950's. Payroll expenses, the largest item of cost, increased from less than 16 percent of net sales in 1945 to more than 18 percent in the early 1950's. Operating profits increased from less than 2 percent of net sales in 1939 to almost 10 percent in 1945 and then were reduced to about 2 percent in the early 1950's.

WOOL PRICE RELATIONSHIPS, PROGRAMS, AND TARIFFS

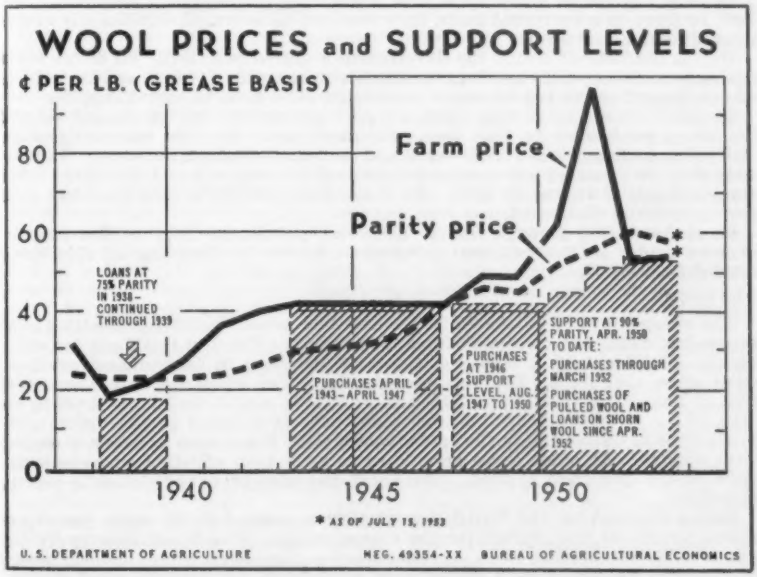
*Domestic wool prices*

Although domestic wool production usually changes relatively little from year to year, prices fluctuate widely because of changes in demand for wool.

Prices of the various classes and grades of apparel wool tend to rise and fall together although the price changes may be of different magnitudes owing to shifts in the supply and demand of the various grades and staples. Changes in fashion and in disposable income strongly influence both the demand for different classes and grades and the spread in prices between them.

A Government loan program was initiated early in 1938 to support prices to producers. The Commodity Credit Corporation made loans to growers at 75 percent of parity (fig. 8). Prices increased during 1938 and practically all of the loans were redeemed by growers. Loans were again made available to producers in 1939, but, as wool prices were higher than a year earlier, few producers took advantage of the program. In August 1939, the average price received by farmers for wool was 22 cents per pound, or 99 percent of parity.

Prices rose sharply after the start of World War II, in September 1939. Prices to growers increased from an average of 28 cents per pound in 1940 to 40 cents per pound in 1942—a period when domestic production was at the highest level


WOOL PRICES and SUPPORT LEVELS
¢ PER LB. (GREASE BASIS)
80
60
40
20
0
Farm price
Parity price
LOANS AT 75% PARITY IN 1938–CONTINUED THROUGH 1939
PURCHASES APRIL 1943–APRIL 1947
PURCHASES AT 1946 SUPPORT LEVEL, AUG. 1947 TO 1950
SUPPORT AT 90% PARITY, APR. 1950 TO DATE:
PURCHASES THROUGH MARCH 1952
PURCHASES OF PULLED WOOL AND LOANS ON SHORN WOOL SINCE APR. 1952
1940
1945
1950
* AS OF JULY 15, 1953
U. S. DEPARTMENT OF AGRICULTURE
NEG. 49354-XX BUREAU OF AGRICULTURAL ECONOMICS

of record. The rise in price of domestic wools was mainly the result of the "Buy American" and other military procurement policies, and the increased demand for wool for both military and civilian goods. The United States Government restricted the use of wool in the manufacture of nonmilitary items.

The sharp increase in prices in the early 1940's was accompanied by a rise in sheep producers' costs. Following 1942, a world surplus of wool, including war reserves of foreign wools, posed a threat over the domestic market. Growers appealed to the Government for some form of price support. In April 1943 the Commodity Credit Corporation began buying the domestic clip at OPA ceiling levels for the different grades and lengths. The Government purchase prices averaged around 42 cents per pound, farm basis, which at the time the purchase program was inaugurated was 141 percent of parity. This support program continued until April 15, 1947. Support prices remained around 42 cents throughout that period, while parity prices advanced. By 1947, parity prices exceeded the support level.

Support was resumed in August 1947 under mandatory provisions of Public Law 360 of the 80th Congress which required CCC to support the price of domestic wool at the same support level as in 1946 until December 31, 1948. This mandatory requirement was extended through June 30, 1950, by the Agricultural Act of 1948.

Since April 1, 1950, CCC has supported the price of wool at 90 percent of parity in accordance with provisions of the Agricultural Act of 1949. For the year beginning April 1950 the national average support level was 45 cents. The following year it was 51 cents. On April 1, 1952, it was raised to 54 cents, but on April 1, 1953, it was lowered slightly to 53 cents.

The outbreak of the Korean conflict in May 1950 started an unparalleled rise in wool prices. The average price to the Nation's growers rose from 55 cents a pound in May 1950 to a record high of $1.12 a pound in March 1951. From that peak, prices dropped even more sharply than they had advanced. By March 1952 prices averaged about 54 cents—close to the 1951 support level. They were from 1 to 4 cents below the support level throughout the marketing season of April 1952 to March 1953. No wool was purchased under the 1950 and 1951 programs but support operations were resumed during the 1952 and 1953 seasons under a program of support loans to producers of shorn wool and direct purchases of pulled wool.

In only 4 of the 10 years since 1943, when wool price-support programs have been in force on a continued basis, have wool prices averaged significantly above the average support levels.

During the 1943–46 period the Government acquired practically all of the wool produced in this country and large quantities were accumulated in stocks. Much of our domestic-wool requirements were being filled from imported supplies.

By 1946 CCC stocks of wool reached a peak of some 500 million pounds—about 1½ times production in that year. Stocks of wool declined substantially in 1947–49 as selling prices were lowered and open-market prices advanced. During 1948 and 1949, market prices averaged around 49 cents a pound compared with support levels of around 42 cents. By the end of 1949 CCC's wool inventory had been practically eliminated.

From April 1943 through March 1950, CCC purchased 1,634 million pounds of wool under its price-support programs. Losses in disposing of this wool totaled $92,200,000.

*The tariff*

The sheep industry in the United States has become established with tariff protection which has continued for a long period. The first tariff act for wool became effective July 1, 1816, and the tariff has been in force almost continuously since that time. The only periods since 1816 when wool was imported free of duty were from August 1894 to July 1897, and from December 1913 to May 1921. Over the years many changes have been made in the tariff, both in the type of duties and in the rates themselves. Sometimes ad valorem duties have applied. At other times specific rates have been effective, and combinations of the two have applied. The tariff has also protected domestic manufacturers.

Duties imposed by the Tariff Act of 1922 amounted to 31 cents per clean pound for grease wool except for the coarse grades. The Smoot-Hawley Tariff Act of 1930 established rates for raw wool at, in general, the highest levels in history. Relatively high duties were established for manufactured woolen goods. The 1930 rate on fine raw wool in the grease was increased 3 cents to 34 cents per clean pound.

The tariff rates for wool listed below illustrate the trend in wool duties over the past 30 years:

| Grade of wool and authority: | *Cents per pound, clean content* |
|---|---|
| Wool finer than 44s: | |
| Current rate: GATT, Jan. 1, 1948 | 25.5 |
| Previous rates: | |
| Tariff Act of 1930 | 34.0 |
| Tariff Act of 1922 | 31.0 |
| Wool finer than 40s but not finer than 44s: | |
| Current rate: | |
| Argentina trade agreement, Nov. 15, 1941 | 17.0 |
| Uruguay trade agreement, Jan. 1, 1943 | 17.0 |
| GATT, July 31, 1948 (T. D. 51970) | 17.0 |
| Previous rates: | |
| Tariff Act of 1930 | 29.0 |
| Tariff Act of 1922 | 31.0 |
| Wool not finer than 40s (not used in manufacture of carpets): | |
| Current rate: | |
| Argentina trade agreement, Nov. 15, 1941 | 13.0 |
| Uruguay trade agreement, Jan. 1, 1943 | 13.0 |
| GATT, July 31, 1948 (T. D. 51970) | 13.0 |
| Previous rates: | |
| Tariff Act of 1930 | 24.0 |
| Tariff Act of 1922 | [1] 12.0 |

[1] On actual weight; clean content equivalent would range up to approximately 20 cents, depending upon scoured yield.

Some of the duties established under the 1930 Tariff Act were subsequently reduced by bilateral agreements with such countries as Argentina, Uruguay, and the United Kingdom. These individual country agreements were authorized with the passage of the Trade Agreements Act of 1934, under which concessions granted one country were granted to all other countries. The General Agreement on Tariffs and Trade of 1948 in general reduced the duties on wool 25 percent, the last general reduction in the rates. The current customs duty on grease wool finer than 44's is 25½ cents per clean pound.

The tariff is relatively more effective in supporting wool prices to domestic producers when prices are low than when they are high. With duties on raw wool at a fixed rate per pound, protection becomes relatively less percentagewise as wool prices increase. Similarly, protection in terms of purchasing power becomes relatively less with increases in the level of prices of things that growers buy.

While the tariff has proved to be feasible administratively, certain difficulties have detracted from its effectiveness. For example, certain native or unimproved wools are permitted to enter the United States at a reduced rate (13 cents per clean pound imported in the grease) when used for apparel purposes. This group is often referred to as the "name" wools and include such types as Donskoi, Smyrna, Cordova, Scotch Highland, etc., names which designate the origin of the wool or its general character or color. These wools are supposedly of coarse fibre diameter, nonhomogeneous character, or off color. While the quantities of these "name" wools entering this country for duty purposes are very small, it is believed that some of them have been improved since 1922 when the tariff classification was established. The tariff classifications should be brought up-to-date to make the tariff more effective.

*Price relationships—foreign and domestic wool*

The tariff on wool tends to maintain prices of domestic wool above the world market level, when there is both a free flow of wool to the United States and a free market for domestic wool.

Imported wools generally command a premium over domestic wools of the same grades because of uniformity and better preparation of the foreign wools. Most imported wools are skirted, classed, and packed in compressed bales. Domestic wools are packed in bags as they are shorn, and are sold with little or no further preparation. The much greater uniformity of the imported wools means lower costs to mills and top makers in processing. In many mills most foreign wools are no longer sorted, but are "dumped" or "trapped" which involves much less expense than handling domestic wools. The greater cost of processing domestic wool because of the necessity of sorting much of it is its most important single price disadvantage.

Although the tariff tends to maintain a differential between world prices and domestic prices, the level of domestic prices is particularly sensitive to supply and demand conditions in the United States. Also price support programs and other Government policies have tended to alter the relationships between prices of domestic and foreign wool. Largely as a result of Government policy, prices of domestic wools during the period 1940–46 were substantially above duty paid prices of approximately comparable imported wools. When the Government began to place large military orders for wool textiles in 1940, the War Department, under the provisions of the Buy American Act of 1933, required the use of domestic wools as long as they were available in the grades needed. In 1941 the War Department, in order to encourage an increase in domestic production, allowed substantial differentials in favor of domestic wools when used in military fabrics. The OPA ceiling prices for both domestic and foreign wools, which were put in effect in February 1942, were based upon market prices that prevailed late in 1941, which favored domestic wools. The OPA ceilings became the CCC purchase prices under the domestic price support program. Prices of both foreign and domestic wools changed little during 1942–45 due to the stabilization policies followed by the British and United States Governments.

Selling prices of the CCC which had been the same as purchase prices, were reduced in November 1945 and again in February 1946. But as the CCC was prohibited by law from selling below parity, selling prices were raised as parity increased. Effective August 5, 1947, CCC was authorized to sell wool without regard to parity.

Price advances for foreign wools from September 1946 to mid-1951 were greater than for domestic wools. With the improvement in the market, domestic stocks were liquidated during this period.

The decline in wool prices in 1951 and the resumption of price support activities in early 1952 again reversed these relationships. Since late 1951 prices for a number of foreign wools, duty-paid Boston, adjusted for the preparation differential, generally have been lower than prices for similar domestic wools. As a result, domestic wools from the 1952 and 1953 clips have been accumulating as CCC stocks, while our mills are consuming more and more imported wools.

## Part II. World Trends

### World production of wool

World production of apparel wool is concentrated very largely in five nonindustrialized Southern Hemisphere countries—Australia, New Zealand, Union of South Africa, Argentina, and Uruguay. These countries account for approximately 80 percent of the total production of apparel wool and for more than 90 percent of the apparel wool entering international trade. New Zealand, Argentina, and Uruguay produce mostly medium grades of apparel wool, while Australia and the Union of South Africa produce most of the world's export supply of fine grade merino apparel wools.

Practically all of the wool produced in the United States and about 70 percent of the production of continental Europe and the United Kingdom is of the apparel type; however, most of the wool produced in these areas is consumed domestically and does not enter world trade as raw wool. Except for the United States, the United Kingdom, the five Southern Hemisphere countries, and a few other areas in Asia and South America, the rest of the world produces mostly coarse or carpet wools, most of which are admitted into the United States duty free.

World production of apparel wool is relatively stable, with year-to-year fluctuations depending to a large extent on weather and feed conditions (fig. 9). In Australia, the Union of South Africa, and Argentina especially, sheep raising and production of wool are particularly susceptible to drought and other extreme weather conditions. In recent years the world output of apparel wool has fluctuated around 3 billion pounds, grease basis, (1.8 billion pounds, clean basis) with a high of nearly 3.4 billion pounds in 1941 and a low of 2.9 billion pounds in 1947. (See appendix table 21.)

World production of all wool (apparel and carpet) achieved a wartime peak of 4.2 billion pounds in 1941 with most of the increase in the major wool-exporting countries. After 1941 world production turned downward and continued to decline until a postwar low of 3,710 million pounds was reached in 1947. The decline in the world total reflected a destruction of flocks in Europe during the

war, the less profitable position of the sheep enterprise relative to alternative enterprises in a number of countries, the unfavorable outlook for wool prices, and drought, particularly in Australia and Argentina.

Since 1947 world production has increased at a substantial rate each year under generally appreciating price levels and favorable weather conditions. In 1952 a new record of 4,290 million pounds (about 2,500 million pounds clean basis) was produced.

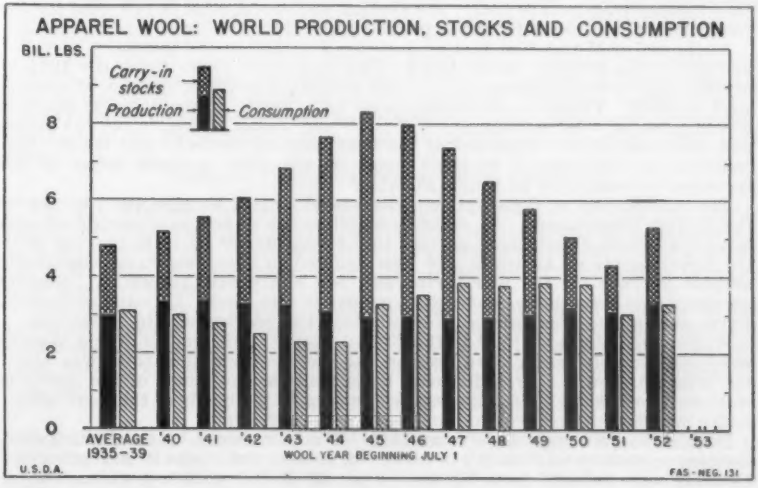
The most significant change in the production of wool has been the sharp reduction in output in the United States, which was down to about 289 million pounds, greasy shorn basis, in 1952, from the wartime average of 477 million pounds and the record high of 502 million pounds of 1942. Production in continental Europe and the United Kingdom has gradually recovered and by 1952 it was about 10 percent above the World War II average and about equal to the 1936–40 average. In all of the five major Southern Hemisphere producing countries except the Union of South Africa, production in 1952 was considerably above the prewar average. It was at record levels in Australia, New Zealand, and Uruguay, and about a fifth to a sixth below record levels in South Africa and Argentina.

### WORLD CONSUMPTION OF WOOL

World consumption of wool in 1934–38 was estimated at about 2 billion pounds a year, clean basis. This was made up of approximately 1.6 billion pounds of apparel wool and about 0.4 billion pounds of carpet wool. The Northern Hemisphere countries—United States, United Kingdom, continental Europe, and Japan—accounted for about 90 percent of the total.

Consumption patterns changed greatly during World War II as continental Europe and Japan were separated from Southern Hemisphere supplies. Consumption in the United States and the United Kingdom increased greatly. Consumption in the Southern Hemisphere countries also increased.

From 1946 to 1950 world consumption was substantially higher than prewar, and higher than current production. By 1949, new consumption patterns had developed. Features of the new patterns include the much higher rate of consumption in the United States and Italy and the trend toward self-sufficiency in woolen textiles in some of the smaller European consuming countries, par-




ticularly Sweden, Switzerland, and the Netherlands. Probably the most significant change in both trade and consumption patterns has been the increase over prewar of more than 230 percent in consumption in the five major surplus-producing countries.

World consumption of all wool reached an all-time high in 1950. Civilian purchases, already at a high level, were increased with scare buying brought on by

the Korean incident. Despite increased military acquisitions, consumption dropped off considerably in 1951 and stocks of raw wool were carried over in South America. But by 1952 an increasing rate of consumption was again noted and world consumption was in approximate balance with world production.

### WORLD TRADE IN RAW WOOL

During 1934-38 about two-thirds of the world's production of apparel wool moved in international trade. With the exception of the United States and the Soviet Union, the principal consuming countries imported 80 to 90 percent of their wool requirements and the principal producing countries exported 80 to 90 percent of their production. The United Kingdom imported an average of nearly 600 million pounds, actual weight, of apparel wool annually during 1934–38, almost a third of world imports. Continental Europe took over 1 billion pounds annually. Only about 4 percent of the total was taken by the United States.

During the war, annual imports into the United States were several times as large as those of prewar, but shipments to continental Europe and Japan were practically zero. Exports from the five Southern Hemisphere surplus-producing countries were only about three-fourths as large as in the 1934–38 period.

International trade in raw wool increased sharply in 1945–46 as trade with continental Europe was resumed. An excess of exports over current production after the war was made possible by the wartime accumulation of stocks.

By 1952 both Germany and Japan had regained their prewar importance as wool consumers. The most significant change in the trade picture, however, has been the increased dependence of the United States on foreign sources of supply. A higher level of consumption and a lower level of domestic production than prewar have made the United States second in importance only to the United Kingdom as an importing Nation.

### WORLD STOCKS OF RAW WOOL

With the exception of the abnormal conditions at the end of World War I, carryover stocks of unsold wool in the major exporting countries during the interwar years were small relative to production. Such limited information as is available, indicates that stocks of raw wool in the consuming countries varied considerably from year to year. The average world carryover of raw wool for the years 1934–39 was about 1.8 billion pounds, grease basis. (See appendix table 21.)

At the end of World War II, world stocks of wool were the largest on record—about 5 billion pounds, grease basis. This was about three times the 1934–39 average and about 60 percent larger than estimated world production of apparel wool in 1950. These stocks accumulated as a result of the reduced wartime consumption of wool in continental Europe and Japan which, in prewar years, had consumed about 75 percent of the wool entering international trade. The reduction in consumption in these countries was only partially offset by the increased consumption in North America.

The greater part of these surplus wools were British Empire wools owned by the British Government. In order to stabilize prices and gain control of supplies the British Government entered into an agreement early in the war with the Governments of Australia and New Zealand to buy their entire exportable surplus of wool for the war period and one clip yearly thereafter. Similar arrangements were later made with regard to the South African production. Large stocks also accumulated in South America, particularly in Argentina.

While trade stocks of wool in the United States at the end of World War II were considerably larger than prewar, the stock-consumption ratio was about the same as prewar. In addition to these trade stocks, much of the domestic wool produced in the United States accumulated in the hands of the Government under its price-support program for domestic wool growers.

During the first postwar season (1945–46) stocks owned by the British Government were reduced from 3.2 to 2.0 billion pounds and stocks in Argentina and Uruguay were reduced from 338 million pounds to 245 million pounds. Only a small part of this reduction entered into consumption during this season, however. The large shipments in 1945–46 reflected, in part, the rebuilding of stocks in trade channels in continental Europe.

In the United States, stocks of wool continued to increase during 1945–46 despite a record peacetime rate of mill consumption. Excluding stocks stored for the British Government, stocks of apparel wool in the United States totaled 931 million pounds, grease basis, on July 1, 1946—three times the average stocks

in 1934–38. Mills and dealers held 432 million pounds, of which 319 million pounds were foreign wool, and CCC holdings totaled 499 million pounds.

The high rate of world consumption of wool following World War II—between 15 and 20 percent in excess of current production—resulted in the disposal of the large wartime accumulation. All of the CCC holdings were disposed of by mid-1950, and the last of the wools owned by the joint organization were sold in 1951.

There was considerable carryover of wool in producing countries at the end of the 1951–52 season but that has largely moved into consumption. The world wool industry is on a current basis. However, nontrade stocks are held by the CCC and by the United Kingdom Government in its strategic stockpile. There will likely be some year-to-year dislocations in the marketing of the world wool clip, but over a period, large accumulations of new wool are not likely.

### WORLD PRICES

World prices generally responded quickly to the stimulus of war conditions in 1938–39 but they declined with the loss of the continental Europe and Japanese markets and the Governments of the United States and the United Kingdom took steps to purchase the production of the major exporting countries. Limited markets and controlled prices were in effect until mid-1946, when wool marketing was returned to the growers.

Heavy postwar demand for wool allowed the absorption at steadily increasing prices of more than 3 billion pounds of wartime accumulated wool as well as the current clips in the period July 1946 through June 1950.

At the time of the Korean incident in June 1950, world consumption and production were in approximate balance and World War II stocks had been liquidated. The immediate effect was an increase in prices for wool and by March of 1951 prices had reached unprecedented levels. By March 1952 prices had declined to pre-Korean levels and difficulties in marketing wool were being experienced in various countries.

World prices have generally appreciated since March 1952 as world consumption recovered, trade stocks in consuming countries were increased, and about 115–120 million pounds of wool (clean basis) were taken over by Commodity Credit Corporation in price-support operations and by the United Kingdom for its strategic stockpile.

By July 1953 it appeared that current world production and consumption of apparel wool were again in approximate balance. There is no appreciable abnormal carryover in the major producing countries. However, another record clip is forecast for 1953–54 and the better-than-average stock position of mills plus Government stocks probably will preclude any significant change in world wool prices.

## PART III. CURRENT DOMESTIC WOOL SITUATION

The preceding sections present a background discussion of the long time trends in production, consumption, marketing, and price in the sheep and wool industry, both here and abroad. This section will consider some of the recent developments in light of their impacts upon the immediate problems that face the domestic wool industry.

The current difficulties of the domestic wool industry are considered in the following sequence: (1) The decline in both production and consumption; (2) the increase in imports; (3) the increasing carryover of domestic wool; (4) the problems of price; and (5) the current difficulties in carrying on a price-support program.

### DOMESTIC PRODUCTION AND CONSUMPTION

Production and consumption of wool in the United States are both down to relatively low levels. The decline in production has been greater proportionately than the decline in consumption.

The production of domestic wool during the current season is estimated at about the same level as in 1952 (127 million pounds, scoured basis) or 38 percent less than in 1935–39 and 43 percent less than the peak year 1942. The estimated production of shorn wool this year is less than two-thirds of the production objective established by Congress in the Agricultural Act of 1949, as amended.

Mill consumption in the current year is expected to be not greatly different from the 2 previous years. This would be about a third below the 1942 level, more than two-fifths below the record 1946 level, but a third greater than in 1935–1939.

### INCREASING IMPORTS

The share of the domestic wool market represented by imports has increased substantially. Imported wools represented over 71 percent of total mill consumption during the 1952 season compared with less than 20 percent during the prewar period, 1935–39, and 58 percent during the period 1946–50 when CCC stocks were being utilized. It is expected that imports will again form an unusually high proportion of United States mill consumption in 1953.

In addition to the imports of wool, imports of wool tops were unusually heavy during the 1952 season, amounting to 21.4 million pounds, the equivalent of approximately 25 million pounds, scoured basis, of raw wool.

### INCREASING CARRYOVER OF DOMESTIC WOOL

Accompanying the recent increase in utilization of imported wool has been an increase in stocks of domestic wool and a decrease in our stocks of imported wool. Stocks of domestic wools increased from 58 million pounds, scoured basis, on April 1, 1952, to 90 million pounds on April 1, 1953. At the same time United States stocks of foreign wool decreased from 75 million pounds, to 64 million pounds, scoured basis, even though imports were slightly higher than in the preceding year.

The carryover of domestic wool from the 1952 season represents an abnormal peacetime situation. Stocks on April 1, 1953, were the highest since April 1, 1949—they were the equivalent of more than three-fourths of the 1952 season's production of 127 million pounds, scoured basis. Total stocks of domestic wool on hand April 1, 1952, were the equivalent of approximately one-half the 1951 production, while the carryover of domestic wool from the four prewar seasons 1936 to 1938, averaged about 68 million pounds, scoured basis, or approximately one-third of the average season's production.

### PRICE PROBLEMS

Prices received recently by farmers for domestic wool have been unfavorable compared with the standards set by the price support program. The average price received by producers for wool during each month of the marketing season from April 1, 1952, through March 1953 was from 1 to 4 cents below the 1952 clip support level of 54.2 cents. Producers' prices strengthened somewhat during the first three months of the 1953 marketing season, but by September 15, they had dropped back to less than the reduced level of support for the 1953 clip. And continuing imports at current levels likely will have a depressing effect on prices under present conditions.

Prices for a number of grades of imported wools in the Boston market have been low compared with domestic prices. Domestic market prices for a number of grades of foreign wools, comparable to classes representing about 15 percent of our domestic clip, have been below support levels for domestic wools, after allowing for differences in market preparation. (These include Territory Low ¼ Blood; Territory Common and Braid; Fleece Fine short French combing and clothing; Fleece Staple and good French combing ¾ Blood as well as ¼ Blood and Common and Braid). Similarly adjusted duty-paid prices for another group of imported wools have been below the support prices plus carrying charges of comparable domestic wools which comprise another 18 percent of our domestic clip. These include all graded Territory wool coarser than Fine and Low ¼ Blood Fleece.

When a producer obtains a Government loan on his wool he incurs certain carrying charges including storage and handling charges, and if he redeems his wool in order to sell it on the open market, he must pay interest on the loan as well as a sales commission to the handler. It has been estimated that these charges may average some 3 to 4 cents a pound (grease basis) for an average storage period of 8 months. Thus, it is evident that recent prices for classes of wool representing more than a third of the clip have not been high enough to enable producers to pay off their loans and redeem their wool for sale in the open market.

### PRICE-SUPPORT PROGRAMS

The price-support program for wool is undertaken pursuant to the provisions of the Agricultural Act of 1949, as amended. Section 201 of this act makes it mandatory for the Secretary of Agriculture to support the price of wool at such level between 60 and 90 percent of parity as the Secretary of Agriculture deter-

mines necessary to encourage an annual production of approximately 360 million pounds of shorn wool. Wool is the only agricultural commodity for which Congress has set out a specific quantitative production objective. Since domestic production has been far short of the legislative goal, the price support level has been set at 90 percent of parity since April 1, 1950, in an effort to encourage producers to increase production toward the legislative goal. The support level established for the 1953 season is equal to a national average price of 53.1 cents per pound, grease basis.

The price support operations are being carried out by means of a nonrecourse loan program for producers of shorn wool and by a purchase program for pulled wool. Details of the program were published in the Federal Register on April 17, 1953 (18 F. R. 2169).

The objective of the wool price-support program is to give domestic producers an opportunity to market their wool in an orderly manner through normal trade channels, and at prices not less than 90 percent of parity. It is not the intention of the program nor of the legislation under which it is operated to establish the Government as the outlet for producers' wool. This would defeat the purpose of the production goal objective and the nonrecourse loan program.

The nonrecourse loan enables the producer to take advantage of any market price increase to above the loan level plus carrying charges by redeeming the loan. The producer does not assume any liability in event the market price drops below the loan level. But if he wants to redeem his wool to take advantage of an increase in market prices he must pay certain carrying charges. As long as market prices are below support levels, domestic wool is held off the market, and most if not all of the wool that comes under the support program is "frozen" as far as current domestic consumption is concerned. Meanwhile, domestic mills continue to meet their needs from foreign markets and domestic wool piles up.

The CCC has had to purchase substantial quantities of wool and has incurred losses totaling $92,200,000 on its wool price-support operations in previous seasons. Of this loss, approximately $26 million consisted of carrying charges, including storage costs, transportation, grading, etc. The balance of the loss resulted from the necessity of reducing selling below purchase prices in order to dispose of the wool. This was the largest loss incurred on any storable commodity during the period July 1, 1943, to June 30, 1952.

As the result of the 1952 wool price support operations, the Commodity Credit Corporation acquired title to approximately 100 million pounds of wool—almost 40 percent of all domestic wool produced in 1952. Practically all of this wool is in CCC hands as of September 1953. Possible CCC loss on this and on some 50 million pounds of wool which may be acquired from the 1953 clip will depend, to a great degree, on the duty paid cost of imported wool, and on the period of time CCC is required to carry the wool before it can dispose of it without interfering with price-support operations.

As long as duty-paid prices on some grades of imported wool remain below domestic support prices, a large volume of imported wools will continue to move to the mills, domestic wool will tend to go into stocks, and it will be difficult to dispose of these stocks. Large stocks have a depressing effect on prices.

## PART IV. DEVELOPING THE DOMESTIC INDUSTRY AND FOREIGN TRADE

### REQUIREMENTS AND LEVELS OF PRODUCTION

Both meat and wool are important in our national economy. Lamb is an important part of the diet in the populated areas of the East and the Pacific coast, and wool is one of the important raw materials needed for manufacture of clothing and other civilian and military goods. Our domestic production of wool is of great strategic importance in wartime.

*Military requirements*

No substitute has been developed to completely take the place of wool in fabrics required by the armed services, although manmade fibers and other materials have been used to an increasing extent during the past few years in military fabrics formerly made entirely of wool.

Domestic production of wool falls far short of supplying United States requirements. During peacetime the United States normally is dependent upon southern

hemisphere countries for much of its wool requirements. During mobilization or wartime our reliance on foreign supplies is even greater.[8]

During the 5-year wartime period, 1941–45, annual consumption of wool for military purposes averaged 588 million pounds, grease basis, or 310 million pounds scoured equivalent (table 9). Much of the wool required for the military had to be procured from foreign sources despite our high level of domestic production and the efforts of the War Department to encourage an increase in domestic production by allowing substantial price differentials in favor of domestic wools when used in military fabrics.

TABLE 9.—*Wool consumption for military purposes, United States, average 1935–39, annual 1939 to 1945*

| Period | Wool consumed | | Period | Wool consumed | |
|---|---|---|---|---|---|
| | Grease basis | Scoured basis | | Grease basis | Scoured basis |
| | *Million pounds* | *Million pounds* | | *Million pounds* | *Million pounds* |
| Average, 1935–39 | 6 | 3 | 1942 | 850 | 442 |
| 1939 | 20 | 9 | 1943 | 724 | 385 |
| 1940 | 96 | 43 | 1944 | 483 | 254 |
| 1941 | 310 | 140 | 1945 | 575 | 326 |

A similar type of situation prevailed following the outbreak of hostilities in Korea, despite the marked expansion in the production of synthetic fibers, and the accompanying substitution of synthetic and other materials for wool in various military items. Even though we had been at a high rate of military preparedness for several years and the stocks of wool accumulated under price support programs had only recently been liquidated, the United States had to enter the world market for large emergency orders of wool for military purposes. We were forced to compete with other countries for available supplies. What happened following our entry into World War II and again following the outbreak of hostilities in Korea doubtless would happen again in the event of another military emergency. Current domestic production is the equivalent of only 40 percent of our annual military requirements during World War II. Thus, for defense reasons alone, it appears essential that the United States have a sound and healthy sheep industry.

*Availability of supplies to meet civilian demands*

A sizable domestic production provides a cushion against fluctuations in demand for wool and in foreign prices. The United States mill consumption of raw wool fluctuates widely from year to year due to style changes and changes in the demand for wool textiles. Ready availability of raw wool supplies is an important factor in the mills' operations and hence stocks of finished products for consumers.

Unnecessary dependence upon imports of foreign wool has a tendency to ecourage manufacturers to turn increasingly to synthetic and other fibers during periods of short supply and high world prices for wool. Such fibers are more readily available in the United States than other countries. Control of the production and prices of such fibers permits them to make inroads upon normal outlets for wool, particularly in periods of short supply and high prices of wool, even though the consumer may prefer wool at somewhat lower prices.

*The domestic sheep industry as a source of meat*

As consumers of lamb and mutton, the American people are interested in the maintenance of an abundant supply of meat. Except for some trial shipments from New Zealand, very little lamb or mutton has ever been imported into this country. The difficulties experienced in handling and merchandising the frozen product and the excessive fat it carried have discouraged importations from other countries where supplies are available.

[8] In an article entitled "Conservation in Military Textiles," published in the Quartermaster Review, November–December 1951, Dr. Stephan J. Kennedy indicates that our domestic clip "is averaging only about half" annual military requirements during World War II and "the foreign wool we are using today to supplement our domestic production requires shipping over sealanes of minimum distances of 5,000 to 8,000 miles. To depend upon imports over extended supply lines in time of war is not realistic."

Domestic production of lamb in recent years has been unusually low. During the past 5 years consumption was equivalent to only 4.1 pounds per capita compared with 6.7 pounds during 1935–39. Domestic consumers would use considerably more lamb than the small supplies that are now available.

With the rapid increase in our population which is in prospect, we will have need for the maximum production of meat consistent with our feed and forage resources. It would be in the interest of consumers, therefore, to maintain sheep numbers at least at a level which will utilize feed resources that would not otherwise be utilized or would be less efficiently utilized by other meat animals.

*Effective utilization of feed resources*

While sheep are grown in all of the States, it is largely in the western sheep States that the sheep industry is important both from the standpoint of the agricultural economy of the area, and the operation of the individual farm or ranch. Little more than a fourth of our wool is produced in the native sheep States, where the raising of sheep is usually incidental or supplemental to other enterprises. The large-scale, range-type of sheep production in the West is the principal source of our domestic wool supply. Nearly two-thirds of this western production is in the States where the public lands are used for the maintenance of the flocks for at least part of each year, and nearly a half of it is on farms and ranches with 1,000 or more sheep.

In large sections of the West, the range land is marginal for any use except for grazing sheep. This is true of such lands as the Red Desert of Wyoming and similar poorly watered lands in such States as Utah, Nevada, and Idaho. It also is true of some of the more remote and rough alpine and subalpine summer grazing areas. The lambs and wool marketed from the Western States form an important share of the "harvest" from the vast acreage of grazing land—a share that would not be realized if the sheep industry were not maintained.

Sheep utilize to economic advantage a complexity of grazing resources in the western range area. The forage and feed production of a varied pattern of privately owned, leased, and public lands are fitted together to provide for the year-round maintenance of sheep. The mountain areas which are largely national forests generally are suitable only for summer grazing. The lower range areas, including public lands in Federal grazing districts, are used to carry the sheep through the winter and much of the spring and fall. Privately owned range or pasture lands are generally used for feed production and for grazing during the fall breeding and spring lambing periods. Often these seasonal ranges are widely scattered and sheep must be trailed long distances in their seasonal migrations—distances too great for the movement of cattle.

Some of the more remote sheep ranges in the West remain unutilized because of their inaccessibility, the relatively high costs involved in getting the sheep into them and out again, and the lack of qualified herders who are competent to take sheep into such areas. Also, with an end of the upswing in the cattle cycle in sight, the decrease in cattle numbers which probably will follow should make available additional range resources which can be utilized efficiently by sheep.

While less important in terms of current numbers, a number of farm areas also have opportunities to utilize feed resources more efficiently with sheep. For example, in the irrigated areas—especially the newly developed areas where abnormally large acreages of legumes are planted to build up soil fertility—sheep offer an efficient means of harvesting such crops, the aftermath of other crops, fence rows, and ditch banks. In some of the farming areas to the east where substantial acreages of "surplus" crops will be diverted to other uses, sheep also can be utilized advantageously to harvest the forage crops and the aftermath of other crops grown on the "diverted" acreage.

*Level of domestic production*

The 360 million pounds of shorn wool established by the Congress in the Agricultural Act of 1949, as amended, as a legislative objective for the domestic wool industry is about the level of domestic production in the prewar period, 1935–39. Including pulled wool, it would represent over 200 million pounds of scoured wool, or about 55 percent of our domestic consumption of wool during the last 4 years. As implied by this legislative objective, it would not be feasible for the United States to attempt to become self-sufficient in wool production. Nor does it appear feasible to increase domestic production sufficiently to meet any emergency defense requirements that might arise. However, with the need

to alleviate our dependence on foreign sources in times of emergency, with the domestic need for all the wool and all the lamb and mutton that can be produced in this country, and with forage resources that would permit an expansion in sheep numbers, it would be desirable from the standpoint of the national economy if sheep raising were a sound, efficient, and profitable enterprise at a somewhat higher level of wool and lamb production than at present.

Increased world consumption and the disappearance of large world stocks have an important bearing on the level of domestic production. World consumption of apparel wool exceeded world production in 6 out of the last 8 years and world stocks are no longer excessive. Although world production and consumption have been approximately in balance the last 2 years, the high level of foreign trade in wool since 1945–46 would not have been possible without a decline of over 3 billion pounds, grease basis, in world stocks.

The desirable level of domestic sheep and wool production depends upon the values attached to their strategic importance and to the efficient utilization of our production resources. It depends equally upon the efficiencies which can be achieved in the production, marketing, processing and distribution of domestic wool and its products. The desirable level of domestic sheep numbers will vary from time to time with changes in the production cycle, feed supplies, numbers of other livestock, and cost-price relations. One analysis of domestic wool requirements and sources of supply indicated that the grazing and feed resources of the United States were sufficient for about 37 million head of stock sheep and still have the total of all grazing animals in balance with these resources. Annual wool production from such a number would be around 290 million pounds of shorn wool and 45 million pounds of pulled wool, or the equivalent of about 160 million pounds, scoured basis, as compared with the 127 million pounds produced in 1952.[9] Another analysis, in which a different set of cost-price relationships was assumed, indicated that a balanced livestock population in this country would include about 31 million head of stock sheep and an annual production of about 260 million pounds of shorn wool and about 40 million pounds of pulled wool, or the equivalent of about 144 million pounds of scoured wool.[10]

The level around which numbers of stock sheep should fluctuate should be a level which would assure effective utilization of feed resources and, without undue increases in subsidies, equitable returns to growers for efficient production of qualities of wool and lamb products that can compete effectively for the consumer's dollar. Low production costs of foreign wools, together with the passing of the frontier and the associated increase in domestic producers' costs, doubtless will necessitate a continuation of some type of assistance for the domestic sheep industry if it is to be maintained at a desirable level.

*Rate of increase limited*

The effect of moderately higher levels of domestic wool production on our economy and upon world trade would depend upon the speed with which they were attained, the methods used in increasing production, and our ability to increase domestic consumption of wool. Both biological and economic factors probably will preclude a very rapid increase in wool production. Many producers, especially the larger western producers, are limited in the increases in production which they can make except through the adoption of more efficient production practices, disease control practices, better breeding, and the like. Resultant increases in production would come slowly. Meanwhile, our population is increasing at a rate of nearly 3 million per year and, even without any increase in per capita consumption, we will need more wool. As is indicated later, we do have opportunities to increase domestic wool consumption by effecting economies in the production, marketing, processing and distribution of wool and its products, by developing new and improved qualities and uses of wool, and by a more aggressive promotional effort. These too, are likely to come slowly but it appears probable that a vigorous effort to increase per capita consumption, together with the increased consumption required by a larger population, could keep pace with or exceed the moderate increase in production which is probable.

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[9] Domestic Wool Requirements and Sources of Supply, U. S. Department of Agriculture, June 1950.

[10] Agriculture's Capacity to Produce, U. S. Department of Agriculture, June 1952.

PRODUCTION PROBLEMS AND PROGRAMS

Improvements in production practices and in the efficiency of production are needed to lower production costs and improve the competitive position of sheep and wool. Neither the efficiency with which sheep utilize feed in producing wool and meat, nor that with which farmers and ranchers are using their combined resources in the production of sheep and wool have improved as much as in other farm animals.

A number of things could contribute materially to a more efficient production and to a stabilization of the domestic sheep industry at a desirable level. The more significant of these include:

1. *More effective control of parasitic and infectious diseases.*—Over 80 different kinds of parasites occur in or on sheep in this country. Despite the development of controls through the use of chemicals, parasites continue to cause an estimated loss of over 100 million dollars annually—the equivalent of nearly a fifth of the gross value of all sheep and wool produced in 1952. The substantial losses which parasites continue to cause can be lowered significantly by two positive steps: (*a*) More effective use of known methods of diagnosis and treatment; and (*b*) through research to develop improved chemical treatments for the removal of parasitic infections and for pasture treatment to kill infective stages of the parasites and/or the intermediate hosts which transmit them.

Infectious diseases also are responsible for heavy losses among sheep in spite of the fact that information is available for the control of many of the more important bacterial and virus diseases. A more effective use by sheepmen and veterinarians of modern methods of diagnosis and treatment would reduce significantly the losses caused by such diseases. Vibrionic abortion and the new virus disease, blue tongue, are not satisfactory controlled by known methods and more research is needed. These diseases have the potentiality for causing extensive death loss and even greater economic loss because of adverse effects on condition, damage to wool, interference with reproduction, and the production of an inferior grade of lamb or mutton.

2. *Intensified basic research on nutrition problems, including vitamin requirements for growth and reproduction, the effects of various nutritive factors on the yield and quality of wool, more economical means of supplementation of pastures and range forages, the formation of urinary calculi in lambs, and the effect of supplemental sulfur on production of wool.*—Sheep depend primarily on forage for their feed and less improvement has been made in their rations than for poultry and swine. A pound of gain in chickens can be produced with approximately 25 percent less feed and time than were required a decade ago. Similarly, for swine the decrease has been about 15 percent during the past 15 years during which time active programs for improvement have been under way. Similar progress with sheep would be more difficult to achieve because of the high forage content of their ration, but a better understanding of their nutrition problems could result in substantial reductions in their cost of production.

3. *Improvement in quantity and quality of wool production through breeding.*—Because of the increasing importance of lamb and mutton as a source of income, farmers and ranchers have given more and more attention to the lamb and mutton producing capacity of their flocks. They will continue to emphasize meat production as long as that is the major source of their income. But there is much that many ranchers could do to improve both the quantity and quality of their wool production through improved breeding practices and the adoption of one of the improved or new breeds which have been developed. The basic range breed, the Rambouillet, has been improved for reduced face cover, lamb production, wool quality, and wool yield. The Columbia, a new breed which is particularly adapted to good range conditions in the northern range area, is a large sheep shearing heavy fleeces of ⅜ blood wool and weaning heavy lambs. The Targhee is another new breed which has been developed for slightly less favorable range conditions than the Columbia. It is about midway between the Rambouillet and the Columbia in size, fleece characteristics and lamb production. In time, a breeding program which puts more stress on quantity and quality of wool and less on carcass characteristics could increase both the quantity and quality of wool produced. But, because of the economic importance of mutton to the producer, it is probable that greater progress can be made by continuing to stress both mutton and wool in our breeding programs.

Better breeding practices are needed on many farms and ranches. In Texas and some of the range areas, for example, adoption of practices such as flushing,

or supplemental feeding of the breeding flock prior to the breeding season, and better care during the lambing season would increase the lamb crop, reduce death losses, and improve both the wool clip and the growth rate of lambs. These same objectives have been achieved in a research program currently under way on a cyclic crossbreeding scheme using sheep of the mutton breeds. This work will be especially pertinent in increasing sheep production in the native sheep States.

4. *Improvement in farm and ranch management practices and in the efficiency with which production resources are used in the production of sheep and wool.*—The family-operated sheep ranches for which data are available are not being operated any more efficiently than they were in the predrought period 1930–33. In terms of production per unit of input, they are even less efficient than they were 10 years ago. (See appendix table 8.) Many of the technological developments which have enabled American agriculture as a whole to double its production per man-hour since 1930, compared with only a fifth to a third increase on these sheep ranches, have not been applicable to ranching in the semiarid West. But the wide variation between individual producers in the size of their lamp crop, death losses, rate of lamb growth, and weight of fleeces marketed is evidence that many producers could improve their efficiency and lower their production costs by adopting some of the improved management practices which are available to them.

The lamb crop in the native States has averaged 100 percent during the last 10 years. In the western range States, other than Texas, it has averaged 86 percent. But in Texas, where nearly a fifth of our ewes are located and where most of the sheep are under fence and hence do not have the constant care of a herder, the lamb crop during the last 10 years has averaged only 68 percent. While drought doubtless has reduced the Texas lamb crop in recent years, many Texas ranchers have increased their lamb crops to 80 to 90 percent by adopting improved range and other management practices and by giving their flocks a little more care. They have reduced their death losses, increased their turnoff of both lamb and wool, and reduced their costs of production. If the average lamp crop in Texas were increased from 68 to 80 percent, about a half million more sheep would be produced annually.

5. *Increased grazing capacity and intensification of soil and range conservation on both public and private lands.*—Greater effort should be made by landowners and operators, both private and public, to expand the forage carrying capacity of farm and range lands. Noteworthy progress has been made by Federal agencies and individual operators in developing and adopting soil and grass conservation and improvement practices. Such programs as reseeding, fertilizing, and improving the composition of pastures should be accelerated. Expansion of forage carrying capacities also would result from wider adoption of improved pasture and range management practices, such as better planned watering and salting practices, and deferred and rotated grazing of grass resources.

In the Western States, where vast areas of public lands are grazed in conjunction with privately controlled grazing and feed-producing lands, it appears especially important that forage improvement and management practices be accelerated and intensified on both publicly and privately owned lands. In some areas economic utilization of the forage is largely restricted to grazing by sheep. Any expansion of carrying capacity of such lands, therefore, should encourage increased wool and lamb production.

Investigations by Federal and State agencies to determine improved methods for and the desirability and economic feasibility of such activities as clearing brush land, controlling poisonous weeds, and seeding with more nutritious grasses should be stepped up. Efforts to develop new and improved forage plants, and grazing-capacity experiments on various types of ranges, should be continued and expanded.

The level and stability of sheep production in large areas of the West are affected by the dependability as well as the carrying capacity of the public lands which are used in conjunction with and as an integral part of range operations. Ways need to be found to encourage users of such lands to adopt more improved salting, bedding, and herding practices to increase and stabilize carrying capacities. And where the Federal Government is not in a position to make the necessary investments in stock-watering facilities and fence construction on the public ranges the ranchers who use these lands should be encouraged to do so.

6. *More effective development and dissemination of information on the adaptability of, the necessity for, and the economic effects of improved production practices.*—Expanded efforts are needed to appraise the adaptability and the

economic effects of various improved production practices under different farm and ranch conditions. Information on the effectiveness of such practices on size of lamb crop, death losses, turnoff and quality of wool and mutton, and on net returns to farmers and ranchers is becoming increasingly important to sheep and wool producers.

Needed, too, is a concerted effort to educate producers as to the increasing necessity for more efficient production. Increasing competition from synthetic and other fibers, as well as the need for an expanding foreign trade, preclude the reestablishment of the sheep industry on a sound and prosperous basis by merely imposing additional trade barriers. Such barriers would tend to protect the domestic producer from imported wools. But they also would retard rather than encourage foreign trade, and, in the long run, they would tend to price wool out of the market by increasing the competitive position of other fibers. Producers must be made aware of this change in their competitive position which has accompanied the development and improvement of other fibers. They must be informed of their opportunities to help meet this new situation through the adoption of more efficient production practices. And producer groups must accept a major share of the responsibility for informing individual producers of their changing position and of the various opportunities at their disposal to meet it.

7. *More effective control of dogs and predators in areas where they are a menace to sheep production.*—In the western sheep States, where the heaviest losses are from coyotes, new methods of control have greatly reduced the numbers of these animals in the past 10 years. Use of newly developed poison baits and other measures offer the prospect of eventually eliminating coyotes from most of the open range country. Control of these animals will require further concerted effort on the part of the Fish and Wildlife Service, State game commissions, stockmen, and other interested persons. There is always the possibility of continued reinfestation of range areas by coyotes from other areas where little effort is being made to eliminate them. Many of the newer control methods for coyotes are not feasible in farming States or closely settled ranching areas.

To cope with the dog problem a set of model dog laws should be developed by the Federal Government for submission to States and local governments, which, if enacted and enforced, would tend to reduce losses of sheep, particularly in the native sheep States. Information on sheep losses due to dogs, the suggested model dog laws, and the need to reduce losses should be disseminated widely by the Government and other appropriate agencies.

8. *Fair and equitable returns commensurate with the value of resources used and with returns from alternative enterprises.*—Like any other group of producers, sheep and wool producers must have fair and equitable returns if they are to stay in business. Their returns in 1952 generally were something less than that. Prospects for continued competition from imported wools suggest that protection against such competition will need to be continued if the domestic sheep and wool industry is to be maintained at a desirable level. But, conversely, continued competition from other domestic fibers suggests that producers cannot expect satisfactory returns for anything but efficient production. Specific means of assuring growers equitable returns are the subject of the final section of this report.

### IMPROVING MARKETING, MANUFACTURING, AND DISTRIBUTION

Improvements in marketing grease wool, manufacturing yarns and fabrics, fabricating apparel, and in wholesaling and retailing may contribute in an important way toward promoting a sounder and more prosperous wool industry. Making improvements in these services is emphasized because they account for about 86 cents of the consumer's dollar paid for wool apparel and household goods.

#### *Marketing domestic grease wool*

Preparing for sale to manufacturers: Domestic wools are widely criticized and often discounted in price, as compared to foreign wools, because they are less uniform and because they are contaminated with black and stained fibers, dung locks, and nonscourable branding paints. Preparation practices may be improved so that domestic wool will be more competitive with foreign wool. This is largely a problem of education through the growers pocketbook. Growers need to use only scourable paints where branding is necessary. Black fiber contamination can be prevented in clips from white-faced sheep by shearing black or black faced sheep last and/or by careful sweeping of shearing boards. Dung lock contamination can be prevented by crutching before shearing and/or removal

of tags at shearing. Slow progress in this work can be expected unless growers are well paid for preparing wools that are free of undesirable contaminants.

Further research and experience may show the ways and means as to time, place, and operator for improving uniformity through grading, skirting, and sorting. Grading at shearing sheds is practical in some locations where the clips are large or fairly uniform and when adequate facilities and qualified graders are available. Skirting might also sometimes be feasible under these conditions. The bulk of the domestic wool clip, however, can probably best be graded, skirted, or sorted in warehouses or mills. Experiments need to be carried out to determine under what conditions it might be profitable to sort domestic wool prior to sale to manufacturers.

Pricing and selling on the basis of merit is fundamental to providing incentive for growers to produce the most profitable types of wool and do a good job of preparing it for market. Domestic grease wool is a complex commodity that is usually sold by private treaty at prices negotiated on the basis of estimated quality and clean fiber yield. In order to obtain fair prices there should generally be strong competition between well-informed buyers and well-informed sellers. However, if both sellers and buyers have good and very nearly equal knowledge of yield and of market prices according to quality they should be able to arrive at fair prices.

The knowledge of both sellers and buyers should be improved through the development of better systems for selling on the basis of description, or description and small representative samples. Selling on the basis of reliable description and small samples should lead to economies in showing, storing, and shipping, and provide for better competition in centralized trading places. It is necessary to have reliable descriptions, made in accordance with uniform standards, or descriptions and small representative samples for this type of trading to be efficient and effective. Further work in the development of adequate standards and in the technology of sampling and testing is needed. Reliable commercial grease-wool classification services in which growers, marketers, and manufacturers have confidence should be further developed. Selling wool at well-planned and organized auctions might prove to be worthwhile. More widespread use of futures markets on an intelligent basis should improve these media for minimizing time-price risks through hedging.

*Processing and manufacturing*

Although substantial improvements have been made in recent years, manufacturers can give further assistance in promoting a sound and prosperous domestic wool industry by more effective use of domestic wools that are relatively best adapted, physically and economically, to the production of particular products; by improving the quality and developing a wider variety of suitable and attractive fabrics and finishes of good quality made of wool and combinations of wool and other fibers; and by increasing the efficiency and reducing the costs of manufacturing operations.

Better adjustments in the qualities of domestic wool used would need to be based on at least fairly complete information designed to show specifically the influences of the differences in the quality of wool on its value for use in the manufacture of specified products, on the costs of the wool to mills, on the costs of producing the wool, and on the prices to farm producers. If this information were available, it would supply a basis for approximating the best adjustments in quality of wool to mill requirements. Developments in technology, in wool production, and in other factors may result in considerable changes in quality of wool that are relatively best adapted to the production of specified products.

Improvements in the quality, suitability, and attractiveness of wool products from the viewpoint of consumers' preferences, along with comprehensive and effective efforts to promote widespread consumer appreciation of these improved products may be especially important as a means of expanding market outlets for wool products. Special chemical treatments offer great possibilities for improving the quality characteristics of wool products so that they will be in a better position to meet the ever-increasing competition of the man-made fibers. For example, it has been demonstrated that the treatment of wool with the chemical known as beta propiolactone greatly improves its felting characteristics. Other developments which would tend to increase the popularity of wool for clothing and household uses would include: (1) Providing whiter wool products which will retain their whiteness during extended periods of use; (2) decreasing the tendency of wool fabrics to shrink during cleaning; (3) developing perma-

nent resistance to attack by clothes moths and carpet beetles; (4) preventing degradation of the wool fiber during processing and subsequent use; (5) improving the surface characteristics of the wool fiber to decrease retention and facilitate removal of soil, and to reduce scratchiness during wear.

Improvements also can be made in the mechanical processing of wool into yarns and fabrics. This would include the development of processes for blending wool with other fibers. At the present time, virgin wool fabrics account for less than 3 percent by yardage of the total fabrics used in this country. The creation of fabrics of superior quality by blending wool with other fibers would be especially helpful in improving the competitive position of wool in the textile markets. An aggressive program for fully utilizing the results of research and other technological developments is needed.

Feasible means of increasing the efficiency of manufacturing operations would be revealed by detailed cost data for representative operators in each important segment of the industry showing the influence of such factors as kinds of equipment and techniques used, size and organization of the business units, kinds of raw materials used, and other factors on the unit costs of labor and overhead at each important stage of processing under actual operating conditions. Detailed specifications, based on cost-engineering data, and other information, for low-cost establishments for manufacturing typical kinds of products would show the more desirable buildings, machinery, and equipment, floor plans, labor requirements, operating programs, and production data. Detailed cost data for the various processes and operations also would be needed. Such information on the influences of the different factors on cost per unit under actual operating conditions and on detailed specifications and cost data for model low-cost operating units would supply a basis for indicating the most feasible means by which and the extent to which improvements could be made.

Possibilities of making substantial improvements in wool manufacturing operations are indicated by the results of research of this type relating to the carded cotton-yarn industry. This research was designed to show how manufacturers of carded cotton yarn could increase their efficiency and reduce their costs. Possible reductions in manufacturing costs indicated for individual establishments averaged more than one-fifth of the total. Reports indicate that results of similar studies in other segments of the textile industry would be likely to present even greater possibilities. Economic applications apparently are lagging far behind technological developments in the textile manufacturing industry, with the result that manufacturing costs are substantially higher than would be the case if economic benefits of technological developments were fully utilized.

Some of the more promising means of increasing efficiency and of reducing costs of manufacturing textiles, as indicated by the results of the study relating to carded cotton yarn, include increased use of new and modern automatic machinery, some rearrangements of machinery for better flow of work and more efficient operations, increased machine assignments and the equalization of reasonable workloads for machines and employees, and adjustments in the size of mills and in number of products manufactured.

Improvements in efficiency might be achieved also through a more vigorous research program to facilitate the recovery of and to develop new and more profitable uses for unutilized or partially utilized byproducts. Wool wax, for example, usually is not fully recovered or utilized. It causes expensive stream-pollution problems. Demand might be increased through further development of chemical intermediates and plasticizers, lubricants, and scourable branding paints from wool wax or lanolin. Mill fiber wastes might be better utilized from further treatments to produce paints, adhesives, fire foam, and protein concentrates.

*Fabrication of apparel and household textiles*

The large share (34 cents) of the consumer's dollar paid for wool apparel and household textiles that is accounted for by gross margins of fabricators emphasizes the importance of improvements in this industry. Although substantial progress has already been made, additional improvements may be attainable through suitable and attractive styling and good construction of apparel and household products made of wool or wool blends; the education of consumers regarding the quality, variety, and adaptability of these products; timely adjustment sin the manufacture of these products to meet consumer requirements; and increased efficiency in the manufacturing operations so that a variety of suitable and attractive products made of domestic wool can be made readily available to consumers at attractive prices.

Modernization and operation of plants, including the installation of improved machinery and equipment, organization of the plant so as to utilize the machinery and equipment to best advantage, and development of improved working conditions so as to attract and hold competent workers may be an effective means of bringing about improvements in many plants. Modernization of plants and utilization of workers and equipment to their full potentialities, to the mutual benefit of workers and management, apparently offers good opportunities for reducing costs of fabricating apparel and household textiles.

Improvements in management represent an effective means of increasing efficiency. Training and maintenance of an adequate staff of utility operators who are skilled in a number of operations was suggested as one of the improvements needed. Through the use of such operators, a high rate of production can be maintained, despite the high rate of turnover of employees and the specialized training needed.

Many fabricating establishments are apparently too small to make full use of the more efficient methods and equipment. In 1947, for example, about 24 percent of the establishments in the apparel and relating products industry had fewer than 5 employees, more than 40 percent had fewer than 10 employees, and 60 percent had fewer than 20 employees. The size of most such establishments would have to be increased before they could fully utilize improvements in technology and in methods. But large mechanized factories operated on a mass-production basis are limited by the demands of fashion, particularly for women's ware, which requires wide ranges in and frequent changes of styles.

Integrations in the manufacture of apparel and household textiles may offer possibilities for reducing costs. Manufacturers of men's ready-to-wear clothing are integrating to a considerable extent, but apparently opportunities for integration in the women's ready-to-wear industry are limited by the pyramiding of style risks and the variety demanded by retailers.

Available information is not adequate to indicate specifically all the means by which and the extent to which it would be feasible to increase the efficiency and to reduce the costs of fabricating apparel and household textiles. Detailed cost data and specifications for model low-cost establishments similar to those indicated for manufacturers, with appropriate modifications, would provide a basis for constructive action.

*Wholesale and retail distribution*

Improvements in wholesale and retail distribution of wool products may be an effective means of expanding market outlets, increasing returns to woolgrowers, and, in general, promoting a sound and prosperous domestic wool industry. The large share (37 cents) of the consumer's dollar paid for wool apparel and household textiles that is accounted for by gross margins for wholesale and retail distribution emphasizes the importance of improvements.

Means of reducing costs of distributors include methods of increasing general efficiency of existing agencies, concentration of services in the hands of agencies or combinations of agencies that can render them most efficiently, and reductions in "unnecessary" services. Detailed information with regard to the influence of each important factor on efficiency and costs would indicate the most effective means by which and the extent to which it would be feasible to bring about improvements. Analyses of the types suggested for manufacturers, with appropriate modifications, should supply the information needed for constructive action.

Expansion in volume of business per operator appear to offer possibilities for reducing operating expenses per dollar of sale for wholesalers of finished textile products. Census data for 1948 show that average expenses per dollar of sale for wholesalers with annual volume of sales of $200,000 to $500,000 exceeded those for wholesalers with annual volume of sales of $1 million or more by 19 percent for those handing men's and boys' clothing and furnishings, and 9 percent for those handling women's and children's clothing and furnishings.

Integration of the distribution and manufacturing functions may be an effective means of reducing costs of wholesaling. In 1948, according to census reports, operating expenses of wholesaling men's and boys' clothing and furnishings averaged 14.2 percent of net sales for merchant wholesalers and less than 9 percent for manufacturers' sales offices and branches. But information available does not indicate to what extent these differences are accounted for by differences in services rendered.

Efficiency of retailers, especially the smaller ones, may be increased through expansions in the activities of large organizations which provide purchasing

and merchandising services to the smaller independent stores. These services, by helping smaller operators obtain better selections of merchandise, better control of stocks, and increased rate of turnover, may enable them to approximate the merchandising efficiency of the larger distribution outlets.

Retailer's margins may be reduced by simplifying the selling processes so as to permit and encourage some degree of self-selection and self-service by customers. This simplification may be facilitated by open display of merchandise, arranged on the basis of consumer's primary interests, and by convenient arrangements for completing the transaction. Such simplification makes possible reductions in retail margins for some products mainly by reducing payroll costs, which average more than half of the total operating expenses of retailers. Accurate labeling to show the quality and size of the products on the basis of adequate standards would facilitate self-service methods. These and other economies in retailing may make possible substantial reductions in costs of distributing textile products, to the advantage of the entire wool industry and of consumers.

### A PUBLIC-RELATIONS PROGRAM

Maintenance of the domestic wool industry at current or higher levels and an expansion of foreign trade in wool can be accomplished simultaneously only if domestic consumption of wool is increased. Such an expansion in consumption could be achieved. It would be advantageous from the standpoint of producers and consumers alike if sufficient economies were made in the costs of production, marketing, processing, and distribution, and if sufficient improvement were made in the characteristics of the end products of wool to permit their effective competition for the consumers' dollar.

While much work is being done to improve domestic wool and its products, obtain wider use of wool, educate consumers on its many fine qualities, etc., more needs to be done. The national and State woolgrowers' organizations, the National Wool Council, the Wool Bureau, and other organizations within the industry all have active programs for increasing the use of wool and improving the competitive status of the domestic product. The work of the Department's Extension Service and the State agricultural colleges in improving production and preparation of the domestic clip are all-important contributions.

The initiative and leadership for programs to promote the production and improvement of domestic wool must be taken by the woolgrowers. While programs designed to improve the acceptability of domestic wool and increase demand for it are of value to all segments of the industry, manufacturers and distributors of woolen textiles are not wholly dependent upon the supply of domestic wool for their requirements. Their needs are being supplied to an increasing extent from foreign-produced wool and for other fibers. Consequently, they do not have the direct interest in improving the domestic industry as do the growers.

Growers must recognize that they are producing an industrial raw material which must compete on the basis of standards of quality and usability established by foreign-grown wool; that as a fiber wool is in direct competition with other fibers for market outlets available to textile fibers; that in the free play of supply and demand in the open-market domestic wool must meet the competition of foreign wool and other fibers in quality, usability, buyer appeal, and price.

Additional research and educational activities are needed to develop and disseminate among growers information concerning possibilities of increasing the acceptability of domestic wool among manufacturers; and to the consuming public factual information regarding the quality and adaptability of wool and wool products for a variety of uses and the superior properties of wool for specific uses.

### PRICE, TARIFF, AND RELATED PROGRAM ALTERNATIVES

The future of the domestic sheep and wool industry depends to a large extent on the relative returns from sheep production compared with those from alternative enterprises. Net returns to producers depend on prices received and costs of production. The problems of production and marketing and suggestions on how to increase efficiency of operation and their effects on costs and prices are discussed in earlier parts of this report. In this remaining section the problems of price assistance on wool to domestic producers are considered. Continuation of some type of price assistance to domestic woolgrowers, whether through tariffs, loan and purchase programs, or some other type of program, is essential if domestic production of wool is to be maintained at current or higher

levels. Otherwise, further substantial decreases in domestic production would be inevitable.

The price problem of the domestic wool industry is complicated by a number of factors such as the influence of world prices, tariffs, Government price-support programs, and fluctuating conditions of domestic demand and supply. It is a twofold problem: (1) The immediate or short-run problem of relatively low wool prices and large acquisitions under price-support operations; and (2) the longer-run problems of maintaining a fair return to the producers, keeping the price of wool competitive with other fibers, and at the same time, minimizing interference with foreign trade in wool and other commodities.

As an immediate problem the Department of Agriculture is required to support prices of wool with methods authorized by law as discussed earlier. Continuation of current legislation would require, for all practical purposes, that this support remain at 90 percent of parity during the foreseeable future in view of the fact that domestic production likely will remain well below the legislative objective of 360 million pounds of shorn wool.

Duty-paid prices for some types of imported wools have fallen below the support level for comparable domestic wools which comprise important segments of the domestic wool clip. As a result the Government already has acquired over 100 million pounds of wool through its price-support operations and it is likely to acquire more. Wool imports, and the proportion of domestic mill consumption represented by imported wools have been larger than they otherwise would have been.

Section 22 of the Agricultural Adjustment Act, as amended, requires that whenever there is reason to believe that imports are coming in under such conditions and in such quantities as to materially interfere with a price-support program or decrease substantially the amount of products processed in the United States, from domestic wool, action must be initiated under the provisions of the law to control the imports and alleviate such interference.

In accordance with the requirements of the law, and as a short-time expedient the Secretary has recommended to the President that action be taken under section 22 of the Agricultural Adjustment Act, as amended, to prevent imports of apparel wool and wool tops from rendering ineffective or materially interfering with the wool price-support program, and from reducing further the amount of wool products processed in the United States from domestic wool. The form of remedial action recommended under section 22 is the application of import feed, in addition to prevailing tariffs, on all apparel wool and wool tops imported for consumption.

While such action appears to be mandatory with current legislation and price relationships, it is recognized, that over an extended period, it probably would have adverse effects upon international trade and upon the competitive position of wool in relation to other fibers. Such action, thus, may not be desirable on a continuing basis over a period of years. However, in view of the legislation, the Secretary has little alternative but to recommend such action.

The objective of a desirable long-term program to solve the price problems of wool is one which in the words of the President's letter "* * * will promote the development of a sound and prosperous domestic wool industry and at the same time permit an expanding foreign trade."

Such a program should: (1) Encourage efficient production and marketing practices but with a minimum of Government supervision of individual producers and minimum interference with the textile industry; (2) require a minimum of cost to consumers and the Government compatible with the achievement of the main objectives; (3) include a pricing policy that would assure growers adequate returns and at the same time enable wool to meet the current and potential competition of foreign wool and of other fibers; (4) provide sufficient flexibility to meet changing conditions and adequate continuity to permit the planning of production and marketing programs with confidence and to assure domestic growers dependable returns and exporting countries a dependable market; and (5) it must fit into overall farm policy as well as United States international trade policy.

The Secretary is currently engaged in a careful study of the entire farm program with a view to determining the type of program or programs which would best contribute to the welfare of the country and of the agricultural economy. Attention is being given to various methods of achieving the objectives of the agricultural program. In the case of wool, as for other commodities, a number of alternatives have been suggested to the Department. Some of the alternatives and some of their major effects, assuming the same level of returns to the grower for domestic wool, are discussed below.

*Increasing the tariff*

It has been suggested that price assistance for domestic woolgrowers be provided solely by the tariff on wool and wool manufactures and that required additional assistance be obtained by increasing the present duties. These proposals seek to raise the domestic wool price level by increasing the cost of foreign wools. Advocates of this proposal point out that the tariff on wool has been reduced from 34 to 25½ cents, and, in addition, that the increase in the general level of prices has decreased materially the protection afforded by the tariff. Some suggest an increase in the tariff of a fixed amount per pound whereas others relate the increase to the parity price of wool. The principal effects of using the tariff as a means of augmenting returns to domestic woolgrowers are:

1. If the fee were merely a fixed fee, it would be very simple to administer. All that would be involved would be a change in the rates of duty as presently collected. However, it would be difficult to achieve a specified price or income objective for producers since the domestic price would move up and down with changes in world prices.
2. The tariff would provide additional revenue to the Government on the wool that is imported.
3. The price of wool would be raised in comparison with prices of synthetics and other fibers, thereby weakening the competitive position of wool. If continued over a period of time it could impair permanently the domestic demand for wool.
4. The cost of wool products to consumers likely would be increased more than the amount of the increase in the tariff because of the pyramiding of many of the costs in marketing, processing, and distribution with an increase in the cost of raw materials. Thus, the cost to consumers would be greater than the combined benefits to woolgrowers and revenues to the Government resulting from the increase in duties.
5. A significant increase in the tariff would retard foreign trade and it might encourage retaliation by wool-exporting countries.
6. There are certain problems encountered in making the tariff effective. For example, some wool-exporting countries are using multiple rates of currency exchange to subsidize exports to the United States. Countervailing duties are presently being levied to offset the benefit of bounties being received by exporters of wool tops from Uruguay.

Some suggestions provide for a flexible tariff to raise the duty-paid price of wool to parity. Under this approach import fees would be levied on a lot-by-lot basis when customs appraisals of the wool were made. The fees on imports would be so levied that foreign wools would cost, landed in the United States, the equivalent of 100 percent of the parity for comparable qualities of domestic wools, with appropriate allowances for differences in marketing and conversion costs. This operation would require a schedule of parity equivalents for all grades and classes of wool at each point of entry inasmuch as parity is computed as the average for all domestic wool on a local market basis.

Flexible fees applied lot by lot would have the same general effects as a fixed fee. However, they would be much more complex in administration since they would pose the very great practical problem of determining and assessing duties on an individual lot basis. There would also be the problem of maintaining equitable compensatory duties on wool products. Variations in prices and frequent adjustments in the fees required would interfere with the volume of trading and the movement of wool in and out of bond. It would tend to encourage the movement of imported wool into bond during periods of high duties and out of bond during periods of lower duties.

*Import quotas*

It has been suggested that quota limitations on imports of wool be used to increase wool prices in the United States by limiting supplies. Also suggested have been various combinations of quotas and tariffs or import fees, such as the imposition of increased duties, once specific quotas were filed. Restrictions on imports to hold domestic wool prices above world levels would include the following major effects:

1. They would pose serious administrative problems in permitting imports of the particular kinds and types desired by domestic mills. A wide and changing variety of classes and grades of wool from many countries are imported to fill the diverse requirements of manufacturers. It would be most difficult if not impractical, to determine in advance the quantities of specific types to be covered under the quotas.

2. Import quotas would encourage retaliatory action by other nations.

3. By restricting supplies of foreign wools and raising prices, import quotas would encourage the use of competing fibers. Continued restrictions on imports could seriously and permanently curtail the domestic demand for wool.

4. The price benefits to domestic growers would be less than the additional costs to domestic consumers of wool products because of the pyramiding of processing and distribution costs.

5. Import quotas per se would not provide revenue to the Government.

*Government loans or purchases (assuring current tariff)*

Loans on shorn wool and purchases of pulled wool by CCC are presently being used in addition to tariffs to support prices of domestic wool. Some of the principal effects of loan and purchase programs as currently operated as a method of increasing returns to wool growers are:

1. The wool grower has an assured outlet for his wool at the support level irrespective of the course of domestic or world market prices. He has the opportunity of obtaining more than the support level in the event of a rise in prices prior to maturity of the loan.

2. Administration of the program involves additional expense and processes in marketing. Each lot of wool must be appraised. Extra accounting and other features are required, all of which add to the costs.

3. When the support price is higher than the open market price, domestic wools move into Government hands and imported wools take their place in supplying current wool consumption requirements. When this occurs, under existing legislation (sec. 22 of the Agricultural Adjustment Act, as amended) it becomes necessary to take action to control imports through imposition of fees or quotas, the effects of which have been indicated in the preceding sections.

4. Over the long run programs of this type tend to stabilize prices around the support level rather than to significantly increase prices to producer. The wool acquired by CCC must eventually be disposed of chiefly in the United States. If it is placed immediately on the open market, prices may be held down or depressed to a point where current marketings by wool growers will continue to move to CCC, thereby creating new holdings. Likewise, if acquired wool is held until prices reach a certain level, the stocks impose a ceiling over the open market. This hampers growers in selling their current clip until this backlog is finally absorbed. Until the rise in prices is of sufficient duration and magnitude to absorb the backlog, the loan and purchase programs tend to hold returns to domestic wool growers at the support level.

5. Losses incurred in acquiring and disposing of wool over the long run can be substantial.

A loan-and-purchase program also could be administered in a manner which would approach direct payments to growers. The Government could stand ready to acquire wool at a specified price level and immediately thereafter place it on the open market irrespective of the market price. In periods of relatively low prices, however, essentially all domestic wool would go through the hands of the Government and the costs incurred by the Government would be substantial.

*Payments to growers (assuming current tariff)*

Another method of increasing returns to domestic woolgrowers would be to allow wool prices to seek their own level in the market under current tariff protection and, in lieu of current price-support operations, to make payments to growers when necessary to supplement the returns they receive from the sale of their wool. When, under conditions and periods to be specified, prices received by domestic woolgrowers were below the support level, the individual woolgrower's returns from wool would consist of two parts: (a) the amount he received from the sale of his wool on the open market, and (b) the payment by the Government. A number of ways have been suggested to determine the amount of the payments and the manner in which the payments would be made. Compared with programs supporting the market price of wool, the use of wool payments to growers would have the following major effects:

1. It would provide price assistance to producers at specified levels, and at the same time enable the domestic clip to move into consumption and to compete more freely on a price basis with other natural and synthetic fibers than it does with current price-support operations.

2. It would offer an opportunity to encourage increased domestic production of wool without altering the competitive position of wool relative to other fibers.

3. The determination and making of the payments to woolgrowers when necessary could be fairly simple and inexpensive in operation, depending upon the basis of making payments. Nevertheless, there might be problems involved in establishing a method that would be considered satisfactory by all growers since any simple and inexpensive method of making direct payments would necessitate the abandonment of a specific price floor for the individual producer.

4. Payments could be used as an incentive for growers to increase the quality of their wool, to produce the types most in demand, and to obtain the best possible market price for it.

5. Under certain conditions, such as greatly depressed world wool prices, the cost might temporarily become so large as to generate public pressures to control imports. But in general, periodic action such as that currently recommended under section 22 would not be required to protect the domestic price-support program.

6. Possible losses to the Government in the acquisition, storage, and disposition of woolstocks in loan-and-purchase operations would be avoided.

7. Payments to growers would require revenues obtained through taxes or tariffs. Hence they might be subject to criticism and subsequent pressure for their discontinuance on the grounds that they were a direct subsidy to the wool industry.

*Alternative methods of financing wool payments*

One way of financing wool payments would be by direct appropriations from the Treasury. Alternative methods of providing funds for the Treasury to offset payments made to wool growers include use of tariff revenues collected on imports of wool and wool products, and use of a processing tax levied on the manufacture of woolen products. Payments financed by direct appropriations likely would be most vulnerable to criticism and to pressures for their discontinuance on the grounds that they were a direct subsidy to the wool industry even though they would permit lower prices of woolen products to consumers and lower administrative costs. Payments financed by a processing tax or tariff revenues probably would be subject to less criticism as a direct subsidy in that the payments required to maintain growers' income would be smaller (if tariffs or their equivalent in a processing tax were larger) and the necessary funds would be collected from those using wool and wool products. These alternative methods of financing payments to growers are discussed below.

*Processing tax (without tariff).*—Under this proposal a uniform tax would be imposed on the processing of domestic and imported wools and a related tax would be imposed on imports of wool tops and wool manufactures to provide the funds for payments to wool growers. Some suggestions of this type provide for the suspension of the tariff but it could be used either with or without the tariff. Without the tariff, this method of financing would have among others the following major effects:

1. Since a processing tax substantially lower than the current level of tariffs would provide adequate funds to maintain growers' returns at current or higher levels, prices of wool to mills and to consumers would be lower than under current tariffs, and wool could meet more effectively the competition of other fibers. At the same time the rate of payment to producers would be greater and prices received in the open market would be lower than with current tariff levels.

2. The lower rate of processing tax compared with current tariff levels would result in ultimate benefits to consumers in excess of the costs involved because of the pyramiding of costs in prices to consumers. However, the reduction in the cost of wool to mills through use of a relatively low processing tax instead of the tariff at current levels would be largely at the expense of reduced revenue to the Government.

3. The historic relationships between domestic and world prices of wool would be modified. Foreign producers would receive somewhat higher prices in the United States (than under the current tariff) and the domestic market would become more attractive to foreign wool. This would be partly offset by the fact that domestic wool would be available at lower prices. The lowering of the domestic market price level might even result in limited exports of some types of wool.

4. Additional administrative personnel and facilities would be required to collect the processing tax.

*Tariff duties.*—Under this proposal, the tariff on imports of wool and wool products would be continued at current or lower levels, and the payments to woolgrowers would be financed from the duties collected on wool and wool products.

If tariffs were continued at current levels, this plan would have the following major effects:

1. The cost of wool to mills and to consumers would be higher and the competitive position of wool somewhat poorer than they would be with a lower tariff or processing tax. Conversely, the wool payments would be less, and they would be needed less frequently than would be the case without the tariff.

2. The historic relationship between domestic and world prices of wool and wool products would be maintained. The competitive position between domestic and imported wools and between domestic wools and other fibers would not be affected.

3. No increase in administrative costs and facilities would be required to collect the funds for payments to growers.

4. Operation of the plan would be more satisfactory to the wool industry in that the tariff rates established to protect the domestic industry would be continued and the revenues used to maintain the economic position of the industry. It might be considered as establishing a policy or precedent of earmarking the tariff on a commodity to provide price assistance for that specific commodity. But if it were limited to commodities such as wool which are largely imported, such a plan would, in effect, provide additional tariff protection to the domestic industry without the adverse effects on international trade which would accompany an increase in the tariff.

5. At current levels, tariffs would provide the Treasury with revenues substantially in excess of the payments required to maintain growers' returns.

Since the revenue from the wool tariff exceeds the payments required to maintain growers' returns, it would be possible to reduce the tariff and still maintain growers' returns if the tariff revenues were used for financing payments to growers. In fact, growers' returns per pound of wool could be maintained at any specified level by a tariff reduced to the same rate as that of a processing tax required to maintain the same level of returns. For example, the market price of wool, plus payments made possible by a 15-cent tariff, would be the same as the market price plus payments made possible by a 15-cent processing tax without any tariff. Thus, the tariff at lower than current levels and a processing tax at the same level as the lowered tariff could be equally effective in maintaining total growers' returns.

A low tariff would have the same effects on prices of wool to mills and to consumers, and on the competitive position of wool as would an equally low processing tax as previously listed. They would yield the same net revenue to the Government after payments required to raise or maintain returns to growers at specified levels. However, like a relatively low processing tax and no tariff, a reduced tariff would, of course, result in growers receiving a larger proportion of their returns in the form of payments, and revenues per pound of imported wool would be reduced.

APPENDIX TABLE 1.—*Number of stock sheep and lambs on farms and ranches in the 13 range sheep States[1] and the native sheep States, and number of sheep and lambs on feed, United States, selected peak and low years 1867 to 1939 and annually 1940 to 1953*

[In thousands]

| Year | Number of stock sheep and lambs | | | Sheep and lambs on feed, United States | All sheep and lambs, United States |
|---|---|---|---|---|---|
| | 13 range States | Native States | United States | | |
| 1867 | 7,411 | 37,586 | 44,997 | | |
| 1871 | 9,565 | 24,498 | 34,063 | | |
| 1884 | 24,526 | 26,575 | 51,101 | | |
| 1897 | 23,458 | 15,403 | 38,891 | | |
| 1909 | 31,131 | 15,967 | 47,098 | 3,695 | 50,793 |
| 1923 | 22,810 | 9,787 | 32,597 | 4,206 | 36,803 |
| 1934 | 34,060 | 14,184 | 48,244 | 5,259 | 53,503 |
| 1937 | 31,640 | 13,611 | 45,251 | 5,597 | 50,848 |
| 1939 | 31,811 | 13,625 | 45,463 | 5,885 | 51,348 |
| 1940 | 32,162 | 14,104 | 46,266 | 5,841 | 52,107 |
| 1941 | 33,016 | 14,425 | 47,441 | 6,479 | 53,920 |
| 1942 | 34,444 | 14,902 | 49,346 | 6,867 | 56,213 |
| 1943 | 33,537 | 14,659 | 48,196 | 6,954 | 55,150 |
| 1944 | 31,177 | 13,093 | 44,270 | 6,512 | 50,782 |
| 1945 | 28,241 | 11,368 | 39,609 | 6,911 | 46,520 |
| 1946 | 25,536 | 9,989 | 35,525 | 6,837 | 42,362 |
| 1947 | 22,656 | 9,149 | 31,805 | 5,693 | 37,498 |
| 1948 | 21,091 | 8,395 | 29,486 | 4,851 | 34,337 |
| 1949 | 19,335 | 7,605 | 26,940 | 4,003 | 30,943 |
| 1950 | 18,753 | 7,429 | 26,182 | 3,644 | 29,826 |
| 1951 | 19,414 | 7,839 | 27,253 | 3,382 | 30,635 |
| 1952 | 19,524 | 8,526 | 28,050 | 4,038 | 32,088 |
| 1953 | 19,030 | 8,827 | 27,857 | 3,754 | 31,611 |

[1] The 13 range sheep States include Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Texas, and South Dakota. The native States are all other States where sheep generally are raised under farm conditions.

APPENDIX TABLE 2.—*Number of sheep shorn in the 13 range sheep States and in the native sheep States, by size of flocks, 1949*

| Number of sheep shorn per farm | Number of sheep shorn | | |
|---|---|---|---|
| | 13 range-sheep States, 1949 | Native-sheep States, 1949 | United States, 1949 |
| Less than 100 | 1,111,157 | 4,755,117 | 5,866,274 |
| 100 to 299 | 1,454,009 | 1,004,829 | 2,458,838 |
| 300 to 599 | 1,395,364 | 307,539 | 1,702,903 |
| 600 to 999 | 1,376,357 | 124,692 | 1,501,049 |
| 1,000 to 2,499 | 4,080,320 | 158,994 | 4,239,314 |
| 2,500 or more | 6,516,307 | 158,018 | 6,674,325 |
| All farms | 15,933,514 | 6,509,189 | 22,442,703 |

Source: Bureau of the Census.

APPENDIX TABLE 3.—*Average weight of fleece per sheep shorn in the 11 Western States, Texas, South Dakota, native States, and United States, 1909–52*

[In pounds]

| Year | 11 Western States | Texas | South Dakota | Native States | United States |
|---|---|---|---|---|---|
| 1909 | 7.3 | 5.9 | 6.5 | 6.4 | 6.9 |
| 1910 | 7.2 | 6.0 | 6.8 | 6.4 | 6.8 |
| 1911 | 7.3 | 6.1 | 6.8 | 6.5 | 6.9 |
| 1912 | 7.2 | 6.1 | 6.9 | 6.5 | 6.9 |
| 1913 | 7.2 | 6.3 | 7.3 | 6.4 | 6.9 |
| 1914 | 7.1 | 6.4 | 7.4 | 6.4 | 6.9 |
| 1915 | 7.2 | 6.4 | 7.0 | 6.5 | 6.9 |
| 1916 | 7.3 | 7.0 | 7.5 | 6.6 | 7.1 |
| 1917 | 7.4 | 7.0 | 7.3 | 6.8 | 7.2 |
| 1918 | 7.5 | 6.8 | 7.4 | 6.8 | 7.3 |
| 1919 | 7.6 | 7.1 | 7.4 | 6.8 | 7.3 |
| 1920 | 7.6 | 7.0 | 7.0 | 6.7 | 7.2 |
| 1921 | 7.7 | 7.3 | 7.3 | 6.6 | 7.3 |
| 1922 | 7.6 | 7.1 | 7.6 | 6.7 | 7.3 |
| 1923 | 7.8 | 7.2 | 7.7 | 6.8 | 7.4 |
| 1924 | 7.9 | 7.4 | 7.7 | 6.8 | 7.5 |
| 1925 | 8.0 | 7.2 | 7.8 | 6.9 | 7.5 |
| 1926 | 8.2 | 7.3 | 8.2 | 6.9 | 7.7 |
| 1927 | 8.1 | 7.7 | 8.4 | 7.0 | 7.7 |
| 1928 | 8.3 | 8.1 | 8.4 | 7.0 | 7.9 |
| 1929 | 8.1 | 8.2 | 8.2 | 7.0 | 7.8 |
| 1930 | 8.4 | 7.7 | 8.3 | 7.0 | 7.9 |
| 1931 | 8.6 | 7.8 | 8.4 | 7.2 | 8.0 |
| 1932 | 8.1 | 8.1 | 8.0 | 7.0 | 7.8 |
| 1933 | 8.4 | 9.5 | 8.0 | 7.0 | 8.1 |
| 1934 | 8.4 | 8.0 | 8.0 | 7.2 | 8.0 |
| 1935 | 8.5 | 8.2 | 8.2 | 7.3 | 8.0 |
| 1936 | 8.3 | 8.2 | 8.4 | 7.0 | 7.9 |
| 1937 | 8.5 | 8.2 | 7.9 | 7.3 | 8.0 |
| 1938 | 8.6 | 8.1 | 8.2 | 7.0 | 8.0 |
| 1939 | 8.5 | 7.9 | 8.7 | 7.2 | 8.0 |
| 1940 | 8.6 | 7.8 | 8.5 | 7.2 | 8.0 |
| 1941 | 8.8 | 7.7 | 8.7 | 7.4 | 8.1 |
| 1942 | 8.6 | 7.2 | 8.5 | 7.3 | 7.9 |
| 1943 | 8.5 | 7.6 | 8.2 | 7.3 | 7.9 |
| 1944 | 8.4 | 7.6 | 7.9 | 7.2 | 7.8 |
| 1945 | 8.5 | 7.8 | 7.8 | 7.3 | 7.9 |
| 1946 | 8.8 | 7.8 | 8.2 | 7.3 | 8.1 |
| 1947 | 8.8 | 7.7 | 8.3 | 7.4 | 8.1 |
| 1948 | 8.8 | 7.7 | 8.1 | 7.3 | 8.1 |
| 1949 | 8.6 | 7.9 | 8.3 | 7.3 | 8.1 |
| 1950 | 8.9 | 7.7 | 8.6 | 7.4 | 8.2 |
| 1951 | 9.2 | 7.3 | 9.3 | 7.8 | 8.2 |
| 1952 | 9.0 | 7.7 | 8.8 | 7.5 | 8.2 |

Source: Bureau of Agricultural Economics.

APPENDIX TABLE 4.—*Percentage of wool growers' gross income derived from shorn wool, and shorn and pulled wool, United States, by years, 1910–52*

| Year | Pulled wool production | | United States average farm price, shorn wool [2] | Farm value, pulled wool [3] | Sheep, lambs, mutton, and lamb | | Farm value, shorn wool | Farm value of all wool (shorn and pulled) [6] | Total grower income [7] | Percentage of wool growers' income derived from— | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | As pulled | Grease equivalent [1] | | | Value or production [4] | Less pulled wool [5] | | | | Shorn wool [8] | All wool [9] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| | *Thousands of pounds* | *Thousands of pounds* | *Cents per pound* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Percent* | *Percent* |
| 1910 | 40,000 | 64,000 | 21.7 | 13,888 | 68,353 | 54,465 | 66,404 | 80,292 | 134,757 | 49.3 | 59.6 |
| 1911 | 41,000 | 65,600 | 15.8 | 10,365 | 54,694 | 44,329 | 47,759 | 58,124 | 102,453 | 46.4 | 56.7 |
| 1912 | 41,500 | 66,400 | 17.3 | 11,487 | 67,273 | 55,786 | 47,950 | 59,437 | 115,223 | 41.6 | 51.6 |
| 1913 | 43,500 | 69,600 | 16.7 | 11,623 | 65,985 | 54,362 | 44,418 | 56,041 | 110,403 | 40.2 | 50.8 |
| 1914 | 43,000 | 68,800 | 16.6 | 11,421 | 75,312 | 63,891 | 41,559 | 52,980 | 116,871 | 35.6 | 45.3 |
| 1915 | 40,000 | 64,000 | 22.1 | 14,144 | 81,528 | 67,384 | 53,223 | 67,367 | 134,751 | 39.5 | 50.0 |
| 1916 | 43,600 | 69,760 | 26.1 | 18,207 | 87,068 | 68,861 | 63,780 | 81,987 | 150,848 | 42.3 | 54.4 |
| 1917 | 40,000 | 64,000 | 41.6 | 26,624 | 135,124 | 108,500 | 98,453 | 125,077 | 233,577 | 42.2 | 53.5 |
| 1918 | 42,000 | 67,200 | 57.7 | 38,774 | 161,684 | 122,910 | 146,532 | 185,306 | 308,216 | 47.5 | 60.1 |
| 1919 | 48,300 | 77,280 | 49.5 | 38,254 | 134,951 | 96,697 | 133,571 | 171,825 | 268,522 | 49.7 | 64.0 |
| 1920 | 42,900 | 68,640 | 45.5 | 31,231 | 98,354 | 67,123 | 114,117 | 145,348 | 212,471 | 53.7 | 68.4 |
| 1921 | 48,500 | 77,600 | 17.3 | 13,425 | 72,223 | 58,798 | 41,882 | 55,307 | 114,105 | 36.7 | 48.5 |
| 1922 | 42,000 | 67,200 | 27.1 | 18,211 | 97,402 | 79,191 | 61,998 | 80,209 | 159,400 | 38.9 | 50.3 |
| 1923 | 42,500 | 68,000 | 39.4 | 26,792 | 117,985 | 91,193 | 90,607 | 117,399 | 208,592 | 43.4 | 56.3 |
| 1924 | 43,800 | 70,080 | 36.6 | 25,649 | 141,327 | 115,678 | 87,284 | 112,933 | 228,611 | 38.2 | 49.4 |
| 1925 | 46,800 | 74,880 | 39.5 | 29,578 | 166,262 | 136,684 | 99,990 | 129,568 | 266,252 | 37.6 | 48.7 |
| 1926 | 49,600 | 79,360 | 34.0 | 26,982 | 167,385 | 140,403 | 91,514 | 118,496 | 258,899 | 35.3 | 45.8 |
| 1927 | 50,100 | 80,160 | 30.3 | 24,288 | 167,528 | 143,240 | 87,610 | 111,898 | 255,138 | 34.3 | 43.9 |
| 1928 | 51,900 | 83,040 | 36.2 | 30,060 | 193,183 | 163,123 | 113,879 | 143,939 | 307,062 | 37.1 | 46.9 |
| 1929 | 54,500 | 87,200 | 30.2 | 26,334 | 191,972 | 165,638 | 99,056 | 125,390 | 291,028 | 34.0 | 43.1 |
| 1930 | 61,900 | 99,040 | 19.5 | 19,313 | 134,141 | 114,828 | 68,739 | 88,052 | 202,880 | 33.9 | 43.4 |
| 1931 | 66,100 | 105,760 | 13.6 | 14,383 | 102,094 | 87,711 | 51,039 | 65,422 | 153,133 | 33.3 | 42.7 |
| 1932 | 67,100 | 107,360 | 8.6 | 9,233 | 74,666 | 65,433 | 30,202 | 39,435 | 104,868 | 28.8 | 37.6 |
| 1933 | 64,200 | 102,720 | 20.6 | 21,160 | 86,379 | 65,219 | 77,065 | 98,225 | 163,444 | 47.2 | 60.1 |
| 1934 | 60,500 | 96,800 | 21.9 | 21,199 | 99,324 | 78,125 | 80,709 | 101,908 | 180,033 | 44.8 | 56.6 |
| 1935 | 66,000 | 105,600 | 19.3 | 20,381 | 115,850 | 95,469 | 69,613 | 89,994 | 185,463 | 37.5 | 48.5 |
| 1936 | 66,200 | 105,920 | 26.9 | 28,492 | 133,034 | 104,542 | 94,915 | 123,407 | 227,949 | 41.6 | 54.1 |
| 1937 | 66,200 | 105,920 | 32.0 | 33,894 | 150,197 | 116,303 | 113,807 | 147,701 | 264,004 | 43.1 | 55.9 |
| 1938 | 64,500 | 103,200 | 19.1 | 19,711 | 127,161 | 107,450 | 68,917 | 88,628 | 196,078 | 35.1 | 45.2 |
| 1939 | 64,500 | 103,200 | 22.3 | 23,014 | 138,414 | 115,400 | 80,683 | 103,697 | 219,097 | 36.8 | 47.3 |
| 1940 | 62,000 | 99,200 | 28.4 | 28,173 | 149,343 | 121,170 | 105,539 | 133,712 | 254,882 | 41.4 | 52.5 |

See footnotes at end of table.

APPENDIX TABLE 4.—*Percentage of wool growers' gross income derived from shorn wool, and shorn and pulled wool, United States, by years 1910–52*—Continued

| Year | Pulled wool production | | United States average farm price, shorn wool [2] | Farm value, pulled wool [3] | Sheep, lambs, mutton, and lamb | | Farm value, shorn wool | Farm value of all wool (shorn and pulled) [6] | Total grower income [7] | Percentage of wool growers' income derived from— | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | As pulled | Grease equivalent [1] | | | Value or production [4] | Less pulled wool [5] | | | | Shorn wool [8] | All wool [9] |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| | *Thousands of pounds* | *Thousands of pounds* | *Cents per pound* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Thousands of dollars* | *Percent* | *Percent* |
| 1941 | 65,800 | 105,280 | 35.5 | 37,374 | 192,102 | 154,728 | 137,754 | 175,128 | 329,856 | 41.8 | 53.1 |
| 1942 | 66,700 | 106,720 | 40.1 | 42,795 | 235,146 | 192,351 | 155,728 | 198,523 | 390,874 | 39.8 | 50.8 |
| 1943 | 65,200 | 104,320 | 41.6 | 43,397 | 242,294 | 198,897 | 157,587 | 200,984 | 399,881 | 39.4 | 50.3 |
| 1944 | 73,500 | 117,600 | 42.3 | 49,745 | 215,070 | 165,325 | 143,224 | 192,969 | 358,294 | 40.0 | 53.9 |
| 1945 | 70,500 | 112,800 | 41.9 | 47,263 | 227,295 | 180,032 | 128,970 | 176,233 | 356,265 | 36.2 | 49.5 |
| 1946 | 61,300 | 98,080 | 42.3 | 41,488 | 247,693 | 206,205 | 118,805 | 160,293 | 366,498 | 32.4 | 43.7 |
| 1947 | 56,600 | 90,560 | 42.0 | 38,035 | 286,120 | 248,085 | 105,654 | 143,689 | 391,774 | 27.0 | 36.7 |
| 1948 | 46,600 | 74,560 | 49.2 | 36,684 | 283,940 | 247,256 | 114,055 | 150,739 | 397,995 | 28.7 | 37.9 |
| 1949 | 35,600 | 56,960 | 49.4 | 28,138 | 258,616 | 230,478 | 105,223 | 133,361 | 363,839 | 28.9 | 36.7 |
| 1950 | 32,400 | 51,840 | 62.1 | 32,193 | 297,318 | 265,125 | 133,729 | 165,922 | 431,047 | 31.0 | 38.5 |
| 1951 | 25,900 | 41,440 | 97.0 | 40,197 | 366,310 | 326,113 | 218,832 | 259,029 | 585,142 | 37.4 | 44.3 |
| 1952 | 33,600 | 53,760 | 53.3 | 28,654 | 290,360 | 261,706 | 123,873 | 152,527 | 414,233 | 29.9 | 36.8 |

[1] Converted on basis of 1 pound pulled wool equal to 1.6 pounds grease wool.
[2] Average price received by producers for shorn wool.
[3] Column 2 multipled by column 3.
[4] Value of sheep, lambs, mutton, and lamb sold or slaughtered for home consumption; adjusted for inshipments, and changes in inventories.
[5] Column 5 minus column 4.
[6] Column 4 plus column 7.
[7] Column 6 plus column 8.
[8] Column 7 divided by column 9.
[9] Column 8 divided by column 9.

Source: Bureau of Agricultural Economics.

APPENDIX TABLE 5.—*Average prices received by farmers per pound of shorn wool and per hundredweight of sheep, lambs, and beef cattle, United States, 1909–52*

| Year | Wool per pound | Sheep per hundredweight | Lambs per hundredweight | Beef cattle per hundredweight | Year | Wool per pound | Sheep per hundredweight | Lambs per hundredweight | Beef cattle per hundredweight |
|---|---|---|---|---|---|---|---|---|---|
| | *Cents* | *Dollars* | *Dollars* | *Dollars* | | *Cents* | *Dollars* | *Dollars* | *Dollars* |
| 1910 | 21.7 | 4.99 | 6.16 | 4.86 | 1932 | 8.6 | 2.24 | 4.47 | 4.23 |
| 1911 | 15.8 | 4.01 | 5.17 | 4.57 | 1933 | 20.6 | 2.38 | 5.04 | 3.75 |
| 1912 | 17.3 | 4.25 | 5.62 | 5.43 | 1934 | 21.9 | 2.85 | 5.90 | 4.13 |
| 1913 | 16.7 | 4.52 | 5.99 | 6.20 | 1935 | 19.3 | 3.75 | 7.28 | 6.04 |
| 1914 | 16.6 | 4.83 | 6.36 | 6.52 | 1936 | 26.9 | 3.77 | 8.05 | 5.82 |
| 1915 | 22.1 | 5.30 | 6.98 | 6.26 | 1937 | 32.0 | 4.52 | 8.88 | 7.00 |
| 1916 | 26.1 | 6.28 | 8.34 | 6.76 | 1938 | 19.1 | 3.58 | 7.05 | 6.54 |
| 1917 | 41.6 | 9.58 | 12.71 | 8.54 | 1939 | 22.3 | 3.90 | 7.78 | 7.14 |
| 1918 | 57.7 | 10.75 | 13.96 | 9.88 | 1940 | 28.4 | 3.98 | 8.10 | 7.56 |
| 1919 | 49.5 | 9.26 | 12.83 | 9.97 | 1941 | 35.5 | 5.06 | 9.58 | 8.82 |
| 1920 | 45.5 | 8.17 | 11.64 | 8.71 | 1942 | 40.1 | 5.80 | 11.70 | 10.70 |
| 1921 | 17.3 | 4.55 | 7.13 | 5.63 | 1943 | 41.6 | 6.57 | 13.00 | 11.90 |
| 1922 | 27.1 | 5.96 | 9.90 | 5.73 | 1944 | 42.3 | 6.01 | 12.50 | 10.80 |
| 1923 | 39.4 | 6.55 | 10.52 | 5.84 | 1945 | 41.9 | 6.38 | 13.10 | 12.10 |
| 1924 | 36.6 | 6.57 | 10.80 | 5.84 | 1946 | 42.3 | 7.48 | 15.60 | 14.50 |
| 1925 | 39.5 | 7.56 | 12.40 | 6.53 | 1947 | 42.0 | 8.39 | 20.50 | 18.40 |
| 1926 | 34.0 | 7.20 | 11.70 | 6.75 | 1948 | 40.2 | 9.69 | 22.80 | 22.20 |
| 1927 | 30.3 | 7.01 | 11.50 | 7.62 | 1949 | 40.4 | 9.27 | 22.40 | 19.80 |
| 1928 | 36.2 | 7.65 | 12.20 | 9.52 | 1950 | 62.1 | 11.60 | 25.10 | 23.30 |
| 1929 | 30.2 | 7.19 | 11.90 | 9.47 | 1951 | 97.0 | 16.00 | 31.00 | 28.70 |
| 1930 | 19.5 | 4.74 | 7.76 | 7.71 | 1952 [1] | 53.3 | 10.10 | 24.30 | 24.30 |
| 1931 | 13.6 | 3.11 | 5.64 | 5.53 | | | | | |

[1] Preliminary.

Source: Bureau of Agricultural Economics.

APPENDIX TABLE 6.—*Net ranch income investment, and returns on investment on family operated sheep and cattle ranches with specified numbers of livestock in the intermountain region and northern plains, 1930–52*

| Year | Sheep ranches | | | | | | Cattle ranches | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Intermountain region [1] | | | Northern plains [2] | | | Intermountain region [3] | | | Northern plains [4] | | |
| | Net ranch income | Ranch investment | Returns on investment | Net ranch income | Ranch investment | Returns on investment | Net ranch income | Ranch investment | Returns on investment | Net ranch income | Ranch investment | Returns on investment |
| | *Dollars* | *Dollars* | *Percent* | *Dollars* | *Dollars* | *Percent* | *Dollars* | *Dollars* | *Percent* | *Dollars* | *Dollars* | *Percent* |
| 1930 | 2,154 | 36,900 | 5.8 | 3,045 | 38,760 | 7.8 | 2,890 | 33,101 | 8.7 | 1,899 | 27,232 | 7.0 |
| 1931 | 417 | 27,831 | 1.5 | 980 | 30,695 | 3.2 | 1,506 | 27,592 | 5.5 | 261 | 22,481 | 1.2 |
| 1932 | −704 | 20,607 | −3.4 | 882 | 20,062 | 4.4 | 1,228 | 24,246 | 5.1 | 370 | 17,157 | 2.2 |
| 1933 | 1,334 | 17,220 | 7.7 | 2,553 | 21,850 | 11.7 | 976 | 19,445 | 5.0 | 726 | 15,700 | 4.6 |
| 1934 | 1,649 | 19,896 | 8.3 | 1,173 | 24,942 | 4.7 | 20 | 19,789 | .1 | −706 | 16,291 | −4.3 |
| 1935 | 1,875 | 18,771 | 10.0 | 1,377 | 19,934 | 6.9 | 1,657 | 22,900 | 7.2 | −331 | 15,705 | −2.1 |
| 1936 | 4,118 | 23,075 | 17.8 | 2,778 | 25,372 | 10.9 | 1,963 | 24,344 | 8.1 | −775 | 18,433 | −4.2 |
| 1937 | 4,024 | 24,943 | 16.1 | 1,802 | 22,773 | 7.9 | 2,369 | 26,177 | 9.0 | −776 | 18,283 | −4.2 |
| 1938 | 2,891 | 25,372 | 11.4 | 1,565 | 25,631 | 6.1 | 2,302 | 26,634 | 8.6 | 617 | 20,575 | 3.0 |
| 1939 | 3,213 | 24,945 | 12.9 | 3,045 | 25,768 | 11.8 | 2,140 | 27,782 | 7.7 | 991 | 20,805 | 4.8 |
| 1940 | 4,107 | 27,451 | 15.0 | 3,013 | 26,130 | 11.5 | 2,775 | 30,073 | 9.2 | 1,456 | 21,666 | 6.7 |
| 1941 | 6,277 | 29,214 | 21.5 | 5,209 | 28,113 | 18.5 | 4,627 | 34,590 | 13.4 | 2,606 | 22,339 | 11.7 |
| 1942 | 6,291 | 34,304 | 18.3 | 7,406 | 34,666 | 21.4 | 5,237 | 40,125 | 13.1 | 4,943 | 26,079 | 19.0 |
| 1943 | 5,898 | 39,488 | 14.9 | 6,898 | 40,192 | 17.2 | 5,417 | 44,884 | 12.1 | 4,254 | 31,739 | 13.4 |
| 1944 | 4,152 | 42,396 | 9.8 | 5,774 | 38,124 | 15.1 | 4,911 | 45,800 | 10.7 | 4,097 | 32,636 | 12.6 |
| 1945 | 5,044 | 46,161 | 10.9 | 6,520 | 40,959 | 15.9 | 5,883 | 49,955 | 11.8 | 4,351 | 36,670 | 11.9 |
| 1946 | 5,779 | 51,480 | 11.2 | 7,406 | 47,632 | 15.5 | 6,721 | 54,833 | 12.3 | 5,220 | 40,979 | 12.7 |
| 1947 | 8,721 | 63,194 | 13.8 | 8,267 | 56,867 | 14.5 | 9,047 | 66,606 | 13.6 | 8,349 | 54,707 | 15.3 |
| 1948 | 8,598 | 79,230 | 10.9 | 9,096 | 69,044 | 13.2 | 10,761 | 70,602 | 15.2 | 7,841 | 60,149 | 13.0 |
| 1949 | 5,742 | 77,276 | 7.4 | 3,361 | 74,313 | 4.5 | 7,670 | 65,238 | 11.8 | 3,211 | 64,051 | 5.0 |
| 1950 | 11,123 | 82,134 | 13.5 | 9,760 | 68,461 | 14.2 | 8,872 | 70,643 | 12.6 | 5,031 | 59,538 | 8.4 |
| 1951 | 20,793 | 104,891 | 19.8 | 19,337 | 88,758 | 21.8 | 14,043 | 76,015 | 18.5 | 9,791 | 72,234 | 13.6 |
| 1952 | 5,664 | 117,145 | 4.8 | 5,970 | 110,403 | 5.4 | 10,796 | 91,191 | 11.8 | 5,942 | 86,615 | 6.9 |

[1] Ranches with 500 to 3,100 head of all sheep—usually about 1,400 head of stock sheep.
[2] Ranches with 300 to 3,100 head of all sheep—usually about 1,000 head of stock sheep.
[3] Ranches with 50 to 600 head of all cattle—usually about 100 head of breeding cows.
[4] Ranches with 40 to 600 head of all cattle—usually about 80 head of breeding cows.

Source: Bureau of Agricultural Economics.

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APPENDIX TABLE 7.—*Total and hired labor required and cost of hired labor on family-operated sheep and cattle ranches with specified numbers of livestock in the intermountain region and northern plains, 1930–52*

| Year | Sheep ranches | | | | | | Cattle ranches | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Intermountain region [1] | | | Northern plains [2] | | | Intermountain region [3] | | | Northern plains [4] | | |
| | Labor required | | Cost of hired labor | Labor required | | Cost of hired labor | Labor required | | Cost of hired labor | Labor required | | Cost of hired labor |
| | Total | Hired | | Total | Hired | | Total | Hired | | Total | Hired | |
| | *Days* | *Days* | | *Days* | *Days* | | *Days* | *Days* | | *Days* | *Days* | |
| 1930 | 1,034 | 500 | $1,525 | 854 | 401.5 | $916 | 531 | 0 | ---------- | 515 | 104.4 | $219 |
| 1931 | 1,032 | 504 | 1,382 | 852 | 393.0 | 800 | 567 | 39 | $72 | 427 | 29.4 | 55 |
| 1932 | 1,014 | 492 | 872 | 770 | 305.4 | 475 | 573 | 51 | 59 | 492 | 91.3 | 125 |
| 1933 | 1,004 | 485 | 674 | 920 | 455.2 | 587 | 577 | 58 | 52 | 523 | 124.1 | 138 |
| 1934 | 998 | 485 | 771 | 878 | 416.3 | 507 | 579 | 66 | 67 | 400 | 26.5 | 26 |
| 1935 | 955 | 448 | 787 | 647 | 191.6 | 343 | 523 | 16 | 18 | 408 | 33.0 | 47 |
| 1936 | 964 | 460 | 880 | 705 | 253.4 | 449 | 512 | 8 | 10 | 364 | 16.2 | 23 |
| 1937 | 972 | 471 | 998 | 625 | 201.9 | 344 | 488 | 0 | ---------- | 381 | 21.9 | 28 |
| 1938 | 974 | 476 | 934 | 638 | 224.5 | 449 | 476 | 0 | ---------- | 406 | 38.5 | 62 |
| 1939 | 975 | 480 | 1,014 | 669 | 266.9 | 530 | 497 | 2 | 3 | 410 | 46.0 | 75 |
| 1940 | 959 | 467 | 1,011 | 653 | 257.1 | 530 | 476 | 0 | ---------- | 415 | 52.8 | 88 |
| 1941 | 962 | 488 | 1,276 | 699 | 308.7 | 599 | 501 | 27 | 45 | 450 | 89.1 | 140 |
| 1942 | 945 | 489 | 1,739 | 741 | 350.6 | 924 | 509 | 53 | 122 | 466 | 100.5 | 221 |
| 1943 | 941 | 500 | 2,403 | 812 | 416.5 | 1,459 | 519 | 78 | 240 | 471 | 102.8 | 317 |
| 1944 | 940 | 517 | 2,950 | 751 | 354.7 | 1,533 | 512 | 89 | 332 | 485 | 107.9 | 416 |
| 1945 | 944 | 539 | 3,391 | 721 | 316.2 | 1,786 | 505 | 100 | 412 | 458 | 87.0 | 452 |
| 1946 | 951 | 546 | 3,775 | 737 | 311.4 | 1,678 | 485 | 80 | 363 | 441 | 79.4 | 382 |
| 1947 | 983 | 581 | 4,395 | 710 | 273.7 | 1,564 | 471 | 69 | 345 | 444 | 83.1 | 409 |
| 1948 | 1,007 | 602 | 4,755 | 760 | 325.5 | 2,024 | 465 | 60 | 375 | 427 | 76.6 | 421 |
| 1949 | 1,007 | 596 | 4,650 | 765 | 320.7 | 2,113 | 500 | 92 | 563 | 428 | 75.1 | 438 |
| 1950 | 986 | 578 | 4,524 | 755 | 317.3 | 2,062 | 459 | 51 | 352 | 429 | 76.3 | 439 |
| 1951 | 1,009 | 601 | 5,702 | 761 | 329.0 | 2,575 | 469 | 67 | 513 | 436 | 84.1 | 595 |
| 1952 | 1,036 | 628 | 5,491 | 819 | 368.8 | 3,013 | 462 | 60 | 489 | 437 | 91.5 | 666 |

[1] Ranches with 500 to 3,100 head of all sheep—usually about 1,400 head of stock sheep.
[2] Ranches with 300 to 3,100 head of all sheep—usually about 1,000 head of stock sheep.
[3] Ranches with 50 to 600 head of all cattle—usually about 100 head of breeding cows.
[4] Ranches with 40 to 600 head of all cattle—usually about 80 head of breeding cows.

Source: Bureau of Agricultural Economics.

APPENDIX TABLE 8.—*Production per unit on selected types of commercial family-operated farms and ranches, 1930–33, 1939–42, and 1949–52* [1]

| Type and location of farms | Production per unit of input | | |
|---|---|---|---|
| | 1930–33 | 1939–42 | 1949–52 |
| | Index numbers—1930–33=100 | | |
| Sheep ranches: | | | |
| Intermountain region | 100 | 107 | 96 |
| Northern plains | 100 | 107 | 100 |
| Cattle ranches: | | | |
| Intermountain region | 100 | 100 | 93 |
| Northern plains | 100 | 97 | 90 |
| Corn Belt farms: | | | |
| Hog-beef raising | 100 | 118 | 137 |
| Cash grain | 100 | 134 | 142 |
| Dairy farms: | | | |
| Western Wisconsin | 100 | 104 | 107 |
| Eastern Wisconsin | 100 | 112 | 115 |
| Wheat farms: | | | |
| Eastern Dakotas | 100 | 70 | 133 |
| North central North Dakota | 100 | 159 | 166 |

[1] This is a measure of changes in efficiency in production showing the change since the predrought period of 1930–33 in production obtained per unit of all factors used in production. It was derived by dividing the value of total production by the value of all factors used in production, each in terms of constant dollar values.

APPENDIX TABLE 9.—*Roughage-consuming livestock: Animal units fed in year beginning Oct. 1, 13 range-sheep States, native-sheep States, and United States, 1919–20 to 1952–53*

| Year beginning Oct. 1 | 13 range-sheep States | Native-sheep States | United States | Year beginning Oct. 1 | 13 range-sheep States | Native-sheep States | United States |
|---|---|---|---|---|---|---|---|
| | *Thousand units* | *Thousand units* | *Thousand units* | | *Thousand units* | *Thousand units* | *Thousand units* |
| 1919–20 | 26, 577 | 49, 714 | 76, 291 | 1936–37 | 24, 858 | 44, 830 | 69, 688 |
| 1920–21 | 26, 148 | 48, 618 | 74, 766 | 1937–38 | 24, 223 | 44, 133 | 68, 356 |
| 1921–22 | 26, 034 | 48, 537 | 74, 571 | 1938–39 | 23, 783 | 44, 408 | 68, 191 |
| 1922–23 | 25, 639 | 48, 054 | 73, 693 | 1939–40 | 24, 487 | 45, 576 | 70, 063 |
| 1923–24 | 25, 392 | 47, 399 | 72, 791 | 1940–41 | 25, 321 | 46, 837 | 72, 158 |
| 1924–25 | 24, 952 | 46, 194 | 71, 146 | 1941–42 | 26, 734 | 48, 481 | 75, 215 |
| 1925–26 | 24, 292 | 45, 051 | 69, 343 | 1942–43 | 27, 709 | 50, 497 | 78, 206 |
| 1926–27 | 23, 852 | 43, 872 | 67, 724 | 1943–44 | 28, 176 | 51, 768 | 79, 944 |
| 1927–28 | 23, 871 | 43, 366 | 67, 237 | 1944–45 | 27, 660 | 51, 066 | 78, 726 |
| 1928–29 | 24, 333 | 43, 821 | 68, 154 | 1945–46 | 26, 624 | 48, 630 | 75, 254 |
| 1929–30 | 24, 863 | 44, 492 | 69, 355 | 1946–47 | 25, 305 | 47, 196 | 72, 501 |
| 1930–31 | 25, 426 | 45, 311 | 70, 737 | 1947–48 | 24, 262 | 44, 747 | 69, 009 |
| 1931–32 | 25, 591 | 46, 685 | 72, 276 | 1948–49 | 23, 427 | 43, 766 | 67, 193 |
| 1932–33 | 26, 497 | 48, 131 | 74, 628 | 1949–50 | 23, 171 | 44, 063 | 67, 234 |
| 1933–34 | 27, 746 | 49, 610 | 77, 356 | 1950–51 | 24, 116 | 45, 191 | 69, 307 |
| 1934–35 | 25, 323 | 47, 290 | 72, 613 | 1951–52 | 25, 122 | 47, 104 | 72, 226 |
| 1935–36 | 24, 933 | 46, 401 | 71, 334 | 1952–53 | 25, 686 | 49, 436 | 75, 122 |

Source: Bureau of Agricultural Economics.

APPENDIX TABLE 10.—*Percentage distribution of mill consumption of apparel wool, by grades, United States, 1921–52*

| Year | 64s and finer | 58s, 60s | 56s | 48s, 50s | 46s and coarser | Total |
|---|---|---|---|---|---|---|
| 1921 | 25.3 | 16.1 | 22.0 | 32.2 | 4.4 | 100 |
| 1922 | 20.7 | 15.4 | 25.1 | 33.6 | 5.2 | 100 |
| 1923 | 22.6 | 14.2 | 24.0 | 32.7 | 6.5 | 100 |
| 1924 | 26.6 | 14.9 | 23.2 | 26.4 | 8.9 | 100 |
| 1925 | 26.5 | 15.3 | 23.3 | 26.0 | 8.9 | 100 |
| 1926 | 23.9 | 15.3 | 24.0 | 25.3 | 11.5 | 100 |
| 1927 | 27.7 | 15.8 | 21.4 | 21.9 | 13.2 | 100 |
| 1928 | 29.0 | 17.7 | 21.2 | 22.1 | 10.0 | 100 |
| 1929 | 31.4 | 17.6 | 20.5 | 19.8 | 10.7 | 100 |
| 1930 | 37.5 | 18.2 | 17.6 | 17.4 | 9.3 | 100 |
| 1931 | 35.2 | 19.2 | 20.8 | 16.4 | 8.4 | 100 |
| 1932 | 34.5 | 20.3 | 20.5 | 17.7 | 7.0 | 100 |
| 1933 | 37.1 | 17.8 | 19.9 | 16.3 | 8.9 | 100 |
| 1934 | 32.6 | 17.2 | 22.8 | 17.8 | 9.6 | 100 |
| 1935 | 38.1 | 15.4 | 23.0 | 16.7 | 6.8 | 100 |
| 1936 | 36.7 | 14.2 | 21.4 | 15.9 | 11.8 | 100 |
| 1937 | 38.4 | 13.1 | 21.3 | 14.8 | 12.4 | 100 |
| 1938 | 41.4 | 13.3 | 22.1 | 16.3 | 6.9 | 100 |
| 1939 | 42.4 | 13.3 | 21.8 | 14.5 | 8.0 | 100 |
| 1940 | 44.5 | 14.9 | 19.1 | 13.9 | 7.6 | 100 |
| 1941 | 43.2 | 15.1 | 18.6 | 12.8 | 10.3 | 100 |
| | 60s and finer | | 58s up to 60s | | 48s and coarser | |
| 1942 | 52.5 | ---------- | 34.4 | ---------- | 13.1 | 100 |
| 1943 | 46.5 | ---------- | 42.4 | ---------- | 11.1 | 100 |
| 1944 | 46.6 | ---------- | 41.9 | ---------- | 11.5 | 100 |
| 1945 | 47.8 | ---------- | 41.9 | ---------- | 10.3 | 100 |
| 1946 | 54.9 | ---------- | 31.2 | ---------- | 13.9 | 100 |
| 1947 | 62.2 | ---------- | 25.6 | ---------- | 12.2 | 100 |
| 1948 | 62.6 | ---------- | 26.9 | ---------- | 10.5 | 100 |
| 1949 | 54.6 | ---------- | 35.4 | ---------- | 10.0 | 100 |
| 1950 | 56.3 | ---------- | 34.5 | ---------- | 9.2 | 100 |
| 1951 | 58.5 | ---------- | 32.8 | ---------- | 8.7 | 100 |
| 1952 | 51.2 | ---------- | 35.8 | ---------- | 13.0 | 100 |

NOTE.—Percentage for years prior to 1938 are based on reports covering 75 to 80 percent of the industry.

Source: Derived from reports of the Bureau of the Census.

APPENDIX TABLE 11.—*Percentage distribution of apparel wool consumption on worsted and woolen systems, United States, 1921–52*

| Year | System | | | Year | System | | |
|---|---|---|---|---|---|---|---|
| | Worsted | Woolen [1] | Total | | Worsted | Woolen [1] | Total |
| 1921 | 68 | 32 | 100 | 1937 | 67 | 33 | 100 |
| 1922 | 65 | 35 | 100 | 1938 | 67 | 33 | 100 |
| 1923 | 68 | 32 | 100 | 1939 | 69 | 31 | 100 |
| 1924 | 65 | 35 | 100 | 1940 | 66 | 34 | 100 |
| 1925 | 68 | 32 | 100 | 1941 | 64 | 36 | 100 |
| 1926 | 71 | 29 | 100 | 1942 | 54 | 46 | 100 |
| 1927 | 70 | 30 | 100 | 1943 | 48 | 52 | 100 |
| 1928 | 68 | 32 | 100 | 1944 | 50 | 50 | 100 |
| 1929 | 73 | 27 | 100 | 1945 | 50 | 50 | 100 |
| 1930 | 75 | 25 | 100 | 1946 | 57 | 43 | 100 |
| 1931 | 77 | 23 | 100 | 1947 | 64 | 36 | 100 |
| 1932 | 74 | 26 | 100 | 1948 | 66 | 34 | 100 |
| 1933 | 75 | 25 | 100 | 1949 | 59 | 41 | 100 |
| 1934 | 66 | 34 | 100 | 1950 | 67 | 33 | 100 |
| 1935 | 69 | 31 | 100 | 1951 | 59 | 41 | 100 |
| 1936 | 68 | 32 | 100 | 1952 | 54 | 46 | 100 |

[1] Consumption of raw wool on the cotton and other systems of spinning is included in consumption on the woolen system in 1945 and earlier years but not in later years. Consumption on the woolen system includes consumption in batting and felt manufactures in 1946 and earlier years but not in later years.

Source: Derived from reports of the Bureau of the Census.

APPENDIX TABLE 12.—*Apparel wool: United States production, imports, and mill consumption (scoured basis), 1923–52*

[Million pounds]

| Year | Production [1] | Imports [2] | Production plus imports | Mill consumption [3] | Year | Production [1] | Imports [2] | Production plus imports | Mill consumption [3] |
|---|---|---|---|---|---|---|---|---|---|
| 1923 | 133.1 | 161.7 | 294.8 | 311.3 | 1938 | 206.7 | 19.6 | 226.3 | 219.6 |
| 1924 | 137.7 | 75.7 | 213.4 | 249.7 | 1939 | 207.5 | 58.5 | 266.0 | 293.1 |
| 1925 | 146.5 | 98.6 | 245.1 | 251.7 | 1940 | 210.2 | 118.4 | 328.6 | 310.0 |
| 1926 | 155.7 | 104.0 | 259.7 | 254.7 | 1941 | 219.9 | 334.7 | 554.6 | 514.4 |
| 1927 | 164.9 | 77.3 | 242.2 | 258.7 | 1942 | 220.9 | 457.1 | 678.0 | 560.5 |
| 1928 | 177.4 | 47.3 | 224.7 | 232.4 | 1943 | 215.6 | 397.4 | 613.0 | 603.3 |
| 1929 | 185.1 | 60.6 | 245.7 | 253.2 | 1944 | 204.0 | 344.9 | 548.9 | 577.0 |
| 1930 | 201.4 | 46.1 | 247.5 | 200.7 | 1945 | 188.4 | 418.0 | 606.4 | 589.2 |
| 1931 | 215.1 | 23.4 | 238.5 | 237.7 | 1946 | 169.6 | 473.0 | 642.6 | 609.6 |
| 1932 | 204.8 | 8.9 | 213.7 | 188.5 | 1947 | 153.1 | 259.3 | 412.4 | 525.9 |
| 1933 | 212.8 | 23.2 | 236.0 | 215.5 | 1948 | 136.9 | 246.2 | 383.1 | 485.2 |
| 1934 | 207.7 | 18.4 | 226.1 | 167.6 | 1949 | 120.4 | 154.9 | 275.3 | 339.0 |
| 1935 | 208.6 | 26.9 | 235.5 | 319.0 | 1950 | 119.1 | 250.1 | 369.2 | 436.9 |
| 1936 | 205.1 | 69.9 | 275.0 | 299.8 | 1951 | 118.7 | 272.0 | 390.7 | 382.1 |
| 1937 | 206.3 | 90.5 | 296.8 | 274.2 | 1952 [4] | 127.4 | 248.4 | 375.8 | 346.8 |

[1] Rough approximation of clean content of domestic production, actual weight, as reported by the Agricultural Estimating Service, USDA, based on estimated average clean yield of 44 percent for shorn wool and 75 percent for pulled wool. These yields are based on an analysis of the 1946 clip. It should be recognized that yields vary from year to year and over a period of time with areas, weather conditions, breed, and other factors.

[2] Imports for consumption. Data for 1923–41 include all foreign wool except Donskoi, Smyrna, East Indian, Chinese, and similar native or unimproved wools particularly suitable for floor coverings. Data for these years include a small quantity of duty-free wool and exclude a small quantity of dutiable wool. Data for later years include all dutiable wool and exclude all duty-free wool.

[3] Raw wool consumption on the cotton and other spinning systems (other than woolen and worsted) is not included in 1946 and later years. It is included in prior years. Data include consumption in batting and felt manufactures in 1946 and earlier years but not in later years. Prior to 1942 wool was considered as consumed when carded or otherwise advanced beyond scouring or raw stock dyeing. Beginning January 1942, wool was considered as consumed (1) on the woolen system when laid in mixes and (2) on the worsted system when entering scouring bowls. From August 1948 forward consumption on the worsted system is taken as the sum of top and noil production. Data include domestic and for 1923–41 all foreign wool except Donskoi, Smyrna, East Indian, Chinese, and similar native or unimproved wools; data for later years include all dutiable foreign wool and exclude all duty-free foreign wool.

[4] Preliminary.

Source: Import and consumption data compiled from reports of the Department of Commerce.

APPENDIX TABLE 13.—*Mill consumption of cotton, wool, rayon, and acetate, other man-made fiber, flax, and silk, United States, 1921–52*

[Million pounds]

| Year | Cotton [1] | Wool [2] | | | Rayon and acetate [3] | Other man-made [3] | Flax [4] | Silk [5] | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Apparel | Carpet | Total | | | | | |
| 1921 | 2,600.6 | 299.7 | 43.7 | 343.4 | 19.8 | ..... | 8.8 | 51.8 | 3,024.4 |
| 1922 | 2,911.3 | 312.8 | 93.7 | 406.5 | 24.7 | ..... | 12.2 | 57.8 | 3,412.5 |
| 1923 | 3,122.6 | 311.3 | 111.1 | 422.4 | 32.5 | ..... | 15.4 | 61.5 | 3,654.4 |
| 1924 | 2,636.5 | 249.7 | 92.5 | 342.2 | 42.2 | ..... | 8.5 | 59.6 | 3,089.0 |
| 1925 | 3,075.3 | 251.7 | 98.2 | 349.9 | 58.2 | ..... | 12.6 | 76.0 | 3,572.0 |
| 1926 | 3,213.5 | 254.7 | 88.0 | 342.7 | 60.6 | ..... | 16.2 | 76.9 | 3,709.9 |
| 1927 | 3,590.1 | 258.7 | 95.4 | 354.1 | 100.0 | ..... | 11.4 | 85.0 | 4,140.6 |
| 1928 | 3,187.0 | 232.4 | 100.8 | 333.2 | 100.5 | ..... | 13.6 | 87.2 | 3,721.5 |
| 1929 | 3,425.3 | 253.2 | 114.9 | 368.1 | 133.4 | ..... | 14.0 | 96.8 | 4,037.6 |
| 1930 | 2,616.6 | 200.7 | 62.5 | 263.2 | 118.8 | ..... | 15.6 | 80.6 | 3,094.8 |
| 1931 | 2,654.9 | 237.7 | 73.3 | 311.0 | 158.9 | ..... | 7.2 | 87.5 | 3,219.5 |
| 1932 | 2,463.7 | 188.5 | 41.6 | 230.1 | 155.3 | ..... | 7.8 | 74.8 | 2,931.7 |
| 1933 | 3,050.7 | 245.5 | 71.6 | 317.1 | 217.2 | ..... | 10.2 | 70.4 | 3,665.6 |
| 1934 | 2,659.5 | 167.6 | 62.1 | 229.7 | 196.9 | ..... | 10.9 | 60.4 | 3,157.4 |
| 1935 | 2,755.4 | 319.0 | 98.5 | 417.5 | 259.1 | ..... | 12.6 | 72.4 | 3,517.0 |
| 1936 | 3,471.4 | 299.8 | 106.3 | 406.1 | 322.4 | ..... | 13.1 | 67.5 | 4,280.5 |
| 1937 | 3,646.6 | 274.2 | 106.6 | 380.8 | 304.7 | ..... | 14.2 | 64.2 | 4,410.5 |
| 1938 | 2,918.3 | 219.6 | 64.9 | 284.5 | 329.4 | ..... | 3.9 | 57.1 | 3,593.2 |
| 1939 | 3,628.6 | 293.1 | 103.4 | 396.5 | 458.8 | ..... | 14.4 | 55.3 | 4,553.6 |
| 1940 | 3,959.1 | 310.0 | 97.9 | 407.9 | 482.0 | 5.0 | 12.1 | 47.6 | 4,913.7 |
| 1941 | 5,192.1 | 514.4 | 133.6 | 648.0 | 591.8 | 12.0 | 9.7 | 25.6 | 6,479.2 |
| 1942 | 5,633.1 | 560.5 | 43.1 | 603.6 | 620.8 | 24.0 | 23.0 | .2 | 6,904.7 |
| 1943 | 5,270.6 | 603.3 | 32.9 | 636.2 | 656.1 | 38.0 | 13.6 | [7] | 6,614.5 |
| 1944 | 4,700.4 | 577.0 | 45.8 | 622.8 | 704.8 | 48.0 | 9.5 | [7] | 6,175.5 |
| 1945 | 4,515.8 | 589.2 | 55.9 | 645.1 | 769.9 | 51.0 | 7.4 | 1.0 | 5,990.2 |
| 1946 | 4,809.1 | 609.6 | 127.9 | 737.5 | 875.5 | 56.0 | 12.6 | 13.5 | 6,504.2 |
| 1947 | 4,665.6 | 525.9 | 172.3 | 698.2 | 987.9 | 50.0 | 8.8 | 3.2 | 6,413.7 |
| 1948 | 4,463.5 | 485.2 | 207.9 | 693.1 | 1,149.6 | 72.0 | 5.5 | 7.4 | 6,391.1 |
| 1949 | 3,839.1 | 339.0 | 161.4 | 500.4 | 993.4 | 92.0 | 6.1 | 4.0 | 5,435.0 |
| 1950 | 4,682.7 | 436.9 | 197.9 | 634.8 | 1,351.4 | 141.0 | 10.9 | 10.5 | 6,831.3 |
| 1951 | 4,850.4 | 382.1 | 102.0 | 484.1 | 1,276.1 | 205.0 | 11.1 | 7.2 | 6,833.9 |
| 1952 [6] | 4,482.6 | 346.8 | 119.6 | 466.4 | 1,214.7 | 257.8 | 6.7 | 12.6 | 6,440.8 |

[1] Mill consumption as reported by the Bureau of the Census. For American cotton, tare of 22 pounds was deducted from gross weight of bale produced through 1923; for 1924 and thereafter tare as reported by the Crop Reporting Board has been deducted. For foreign cotton, 3 percent (15 pounds) was deducted.

[2] Mill consumption, scoured basis, as reported by the Bureau of the Census.

[3] Domestic shipments plus imports for consumption as published in Textile Organon.

[4] Imports and estimated production as reported by the Bureau of the Census, Bureau of Plant Industry, and Portland, Oreg., office of Bureau of Agricultural Economics.

[5] Net imports through 1933, imports for consumption as reported by the Bureau of the Census for 1934 and thereafter.

[6] Preliminary.

[7] Less than 50,000 pounds.

APPENDIX TABLE 14.—*Per capita mill consumption of cotton, wool, rayon, and acetate, other manmade fiber, flax, and silk, United States, 1921–52*

[Million pounds]

| Year | Cotton [1] | Wool [2] | | | Rayon and acetate [3] | Other manmade [3] | Flax [4] | Silk [5] | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Apparel | Carept | Total | | | | | |
| 1921 | 23.62 | 2.72 | 0.40 | 3.12 | 0.18 | ..... | 0.08 | 0.47 | 27.47 |
| 1922 | 26.09 | 2.80 | .84 | 3.64 | .22 | ..... | .11 | .52 | 30.58 |
| 1923 | 27.51 | 2.74 | .98 | 3.72 | .29 | ..... | .14 | .54 | 32.20 |
| 1924 | 22.79 | 2.16 | .80 | 2.96 | .36 | ..... | .07 | .52 | 26.70 |
| 1925 | 26.17 | 2.14 | .84 | 2.98 | .50 | ..... | .11 | .65 | 30.41 |
| 1926 | 27.00 | 2.14 | .74 | 2.88 | .51 | ..... | .14 | .65 | 31.18 |
| 1927 | 29.74 | 2.14 | .79 | 2.93 | .83 | ..... | .09 | .70 | 34.29 |
| 1928 | 26.08 | 1.90 | .82 | 2.72 | .82 | ..... | .11 | .71 | 30.44 |
| 1929 | 27.74 | 2.05 | .93 | 2.98 | 1.08 | ..... | .11 | .78 | 32.69 |
| 1930 | 20.97 | 1.61 | .50 | 2.11 | .95 | ..... | .13 | .65 | 24.81 |
| 1931 | 21.10 | 1.89 | .58 | 2.47 | 1.26 | ..... | .06 | .70 | 25.59 |
| 1932 | 19.46 | 1.49 | .33 | 1.82 | 1.23 | ..... | .06 | .59 | 23.16 |
| 1933 | 23.96 | 1.93 | .56 | 2.49 | 1.71 | ..... | .08 | .55 | 28.79 |
| 1934 | 20.76 | 1.31 | .48 | 1.79 | 1.54 | ..... | .09 | .47 | 24.65 |
| 1935 | 21.36 | 2.47 | .76 | 3.23 | 2.01 | ..... | .10 | .56 | 27.26 |
| 1936 | 26.74 | 2.31 | .82 | 3.13 | 2.48 | ..... | .10 | .52 | 32.97 |
| 1937 | 27.92 | 2.10 | .82 | 2.92 | 2.33 | ..... | .11 | .49 | 33.77 |
| 1938 | 22.18 | 1.67 | .49 | 2.16 | 2.50 | ..... | .03 | .43 | 27.30 |
| 1939 | 27.34 | 2.21 | .78 | 2.99 | 3.46 | ..... | .11 | .42 | 34.32 |
| 1940 | 29.55 | 2.31 | .73 | 3.04 | 3.60 | 0.04 | .09 | .36 | 36.68 |
| 1941 | 38.37 | 3.80 | .99 | 4.79 | 4.37 | .09 | .07 | .19 | 47.88 |
| 1942 | 41.21 | 4.10 | .32 | 4.42 | 4.54 | .18 | .17 | (7) | 50.52 |
| 1943 | 38.03 | 4.35 | .24 | 4.59 | 4.73 | .27 | .10 | (7) | 47.72 |
| 1944 | 34.14 | 4.11 | .33 | 4.44 | 5.02 | .34 | .07 | (7) | 44.01 |
| 1945 | 31.85 | 4.16 | .39 | 4.55 | 5.43 | .36 | .05 | .01 | 42.25 |
| 1946 | 33.54 | 4.25 | .89 | 5.14 | 6.11 | .39 | .09 | .09 | 45.36 |
| 1947 | 31.93 | 3.60 | 1.18 | 4.78 | 6.76 | .34 | .06 | .02 | 43.89 |
| 1948 | 30.02 | 3.26 | 1.40 | 4.66 | 7.73 | .48 | .04 | .05 | 42.98 |
| 1949 | 25.37 | 2.24 | 1.07 | 3.31 | 6.57 | .61 | .04 | .03 | 35.93 |
| 1950 | 30.45 | 2.84 | 1.29 | 4.13 | 8.79 | .92 | .07 | .07 | 44.43 |
| 1951 | 30.99 | 2.44 | .65 | 3.09 | 8.15 | 1.31 | .07 | .05 | 43.66 |
| 1952 [6] | 28.16 | 2.18 | .75 | 2.93 | 7.63 | 1.62 | .04 | .08 | 40.46 |

For footnotes 1 to 6, see appendix table 13.

[7] Less than 0.005 pounds.

APPENDIX TABLE 15.—*Percentage distribution of mill consumption of cotton, wool, rayon, and acetate, other manmade fiber, flax, and silk, United States, 1921–52*

| Year | Cotton [1] | Wool [2] | | | Rayon and acetate [3] | Other manmade [3] | Flax [4] | Silk [5] | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | Apparel | Carpet | Total | | | | | |
| 1921 | 86.0 | 10.0 | 1.4 | 11.4 | 0.6 | ..... | 0.3 | 1.7 | 100.0 |
| 1922 | 85.3 | 9.2 | 2.7 | 11.9 | .7 | ..... | .4 | 1.7 | 100.0 |
| 1923 | 85.4 | 8.6 | 3.0 | 11.6 | .9 | ..... | .4 | 1.7 | 100.0 |
| 1924 | 85.4 | 8.1 | 3.0 | 11.1 | 1.3 | ..... | .3 | 1.9 | 100.0 |
| 1925 | 86.1 | 7.1 | 2.7 | 9.8 | 1.6 | ..... | .4 | 2.1 | 100.0 |
| 1926 | 86.6 | 6.8 | 2.4 | 9.2 | 1.6 | ..... | .5 | 2.1 | 100.0 |
| 1927 | 86.7 | 6.3 | 2.3 | 8.6 | 2.4 | ..... | .3 | 2.0 | 100.0 |
| 1928 | 85.7 | 6.2 | 2.7 | 8.9 | 2.7 | ..... | .4 | 2.3 | 100.0 |
| 1929 | 84.9 | 6.3 | 2.8 | 9.1 | 3.3 | ..... | .3 | 2.4 | 100.0 |
| 1930 | 84.5 | 6.5 | 2.0 | 8.5 | 3.9 | ..... | .5 | 2.6 | 100.0 |
| 1931 | 82.5 | 7.4 | 2.3 | 9.7 | 4.9 | ..... | .2 | 2.7 | 100.0 |
| 1932 | 84.0 | 6.5 | 1.4 | 7.9 | 5.3 | ..... | .3 | 2.5 | 100.0 |
| 1933 | 83.2 | 6.7 | 2.0 | 8.7 | 5.9 | ..... | .3 | 1.9 | 100.0 |
| 1934 | 84.2 | 5.3 | 2.0 | 7.3 | 6.2 | ..... | .4 | 1.9 | 100.0 |
| 1935 | 78.4 | 9.0 | 2.8 | 11.8 | 7.4 | ..... | .4 | 2.0 | 100.0 |
| 1936 | 81.1 | 7.0 | 2.5 | 9.5 | 7.5 | ..... | .3 | 1.6 | 100.0 |
| 1937 | 82.7 | 6.3 | 2.4 | 8.7 | 6.9 | ..... | .3 | 1.4 | 100.0 |
| 1938 | 81.2 | 6.1 | 1.8 | 7.9 | 9.2 | ..... | .1 | 1.6 | 100.0 |
| 1939 | 79.7 | 6.4 | 2.3 | 8.7 | 10.1 | ..... | .3 | 1.2 | 100.0 |
| 1940 | 80.6 | 6.3 | 2.0 | 8.3 | 9.8 | 0.1 | .2 | 1.0 | 100.0 |
| 1941 | 80.1 | 7.9 | 2.1 | 10.0 | 9.1 | .2 | .2 | .4 | 100.0 |
| 1942 | 81.6 | 8.1 | .6 | 8.7 | 9.0 | .4 | .3 | (7) | 100.0 |
| 1943 | 79.7 | 9.1 | .5 | 9.6 | 9.9 | .6 | .2 | (7) | 100.0 |
| 1944 | 77.5 | 9.4 | .7 | 10.1 | 11.4 | .8 | .2 | (7) | 100.0 |
| 1945 | 75.4 | 9.9 | .9 | 10.8 | 12.8 | .9 | .1 | (7) | 100.0 |
| 1946 | 73.9 | 9.3 | 2.0 | 11.3 | 13.5 | .9 | .2 | .2 | 100.0 |
| 1947 | 72.8 | 8.2 | 2.7 | 10.9 | 15.4 | .8 | .1 | (7) | 100.0 |
| 1948 | 69.8 | 7.5 | 3.3 | 10.8 | 18.0 | 1.2 | .1 | .1 | 100.0 |
| 1949 | 70.6 | 6.2 | 3.0 | 9.2 | 18.3 | 1.7 | .1 | .1 | 100.0 |
| 1950 | 68.5 | 6.4 | 2.9 | 9.3 | 19.7 | 2.1 | .2 | .2 | 100.0 |
| 1951 | 70.9 | 5.6 | 1.5 | 7.1 | 18.6 | 3.1 | .2 | .1 | 100.0 |
| 1952 [6] | 69.6 | 5.3 | 1.9 | 7.2 | 18.9 | 4.0 | .1 | .2 | 100.0 |

For footnotes 1 to 6, see appendix table 13.

[7] Less than 0.05 percent.

APPENDIX TABLE 16.—*Percentage distribution of production of sweaters, knit jackets, and jerseys, by fiber content and type, United States, 1948–51*

| Class and product | 1948 | 1949 | 1950 | 1951 |
|---|---|---|---|---|
| Men's | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 77.9 | 76.4 | 76.0 | 71.1 |
| Part wool, 25 percent or more wool | 6.9 | 6.5 | 9.3 | 10.3 |
| Other | 15.2 | 17.1 | 14.7 | 18.6 |
| Women's: | | | | |
| Sweaters and jerseys | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 74.8 | 68.8 | 64.2 | 58.9 |
| All nylon | 25.2 | 31.2 | 28.7 | 31.4 |
| Other | | | 7.1 | 9.7 |
| Cardigans | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 91.3 | 85.7 | 85.9 | 74.7 |
| All nylon | 8.7 | 14.3 | 7.8 | 15.7 |
| Other | | | 6.3 | 9.6 |
| Boys' | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 73.7 | 69.2 | 64.7 | 47.4 |
| Part wool, 25 percent or more wool | 7.7 | 9.3 | 9.0 | 11.5 |
| Other | 18.6 | 21.5 | 26.3 | 41.1 |
| Girls' | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 97.5 | 90.4 | 79.8 | 69.9 |
| All nylon | 2.5 | 9.6 | 16.9 | 24.5 |
| Other | | | 3.3 | 5.6 |
| Children's | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 78.7 | 75.6 | 62.0 | 50.3 |
| Other | 21.3 | 24.4 | 38.0 | 49.7 |
| Infants' | 100.0 | 100.0 | 100.0 | 100.0 |
| All wool | 85.0 | 75.0 | 73.5 | 64.9 |
| Other | 15.0 | 25.0 | 26.5 | 35.1 |

Compiled from reports of the Bureau of the Census.

APPENDIX TABLE 17.—*Cuttings of specified items of men's tailored clothing and percentage distribution by fiber content, United States, 1946–52*

| Type of garment | Unit | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 |
|---|---|---|---|---|---|---|---|---|
| Suits, total | 1,000 units | 23,135 | 25,723 | 23,412 | 19,497 | 23,595 | 19,491 | 19,306 |
| Regular weight | do | 20,014 | 21,732 | 19,404 | 15,824 | 19,110 | 15,168 | 15,059 |
| 50 percent or more wool.[1] | Percent | | | | | 98.3 | 92.5 | 91.7 |
| Other | do | | | | | 1.7 | 7.5 | 8.3 |
| Summer weight | 1,000 units | 2,121 | 3,991 | 4,308 | 3,673 | 4,585 | 4,323 | 4,247 |
| 50 percent or more wool.[1] | Percent | 72.2 | 72.3 | 66.2 | 54.1 | 49.2 | 34.9 | 27.5 |
| Cotton | do | 27.8 | 7.6 | 33.8 | 45.9 | 50.8 | 65.1 | 72.5 |
| Rayon | do | | 20.1 | | | | | |
| Separate dress and sport trousers. | 1,000 units | 41,796 | 42,950 | 37,742 | 38,533 | 46,998 | 38,858 | 45,864 |
| 50 percent or more wool [1] | Percent | 54.8 | 61.7 | 60.3 | 51.2 | 43.3 | 30.8 | 32.3 |
| Rayon | do | 26.0 | 24.5 | 29.3 | 39.8 | 48.6 | 63.5 | 61.7 |
| Cotton | do | 19.2 | 13.8 | 10.4 | 9.0 | 6.1 | 5.7 | 6.0 |
| Separate coats | 1,000 units | 6,452 | 4,458 | 4,365 | 5,767 | 7,039 | | |
| 50 percent or more wool [1] | do | 90.7 | 81.4 | | | | | |
| Cotton | Percent | 7.8 | 16.5 | | | | | |
| Rayon | do | 1.5 | 2.1 | | | | | |
| Overcoats and topcoats | 1,000 units | 7,941 | 7,233 | 6,194 | 5,628 | 6,550 | 5,514 | 5,312 |
| Overcoats | do | | | | | | 1,335 | 1,002 |
| Topcoats | do | | | | | | 4,179 | 4,310 |

[1] 25 percent or more wool prior to 1951.

Source: Compiled from reports of the Bureau of the Census.

APPENDIX TABLE 18.—*Cuttings of specified items of women's, misses', and juniors' outerwear, and percentage distribution by fiber content, United States, 1946–52*

| Type of garment | Unit | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 |
|---|---|---|---|---|---|---|---|---|
| Dresses (unit-priced) | Thousands | 134,185 | 127,592 | 134,951 | 154,366 | 139,607 | 138,558 | 159,706 |
| Rayon and acetate | Percent | 78.9 | 81.1 | 81.6 | 74.6 | 72.0 | 69.7 | 66.9 |
| Cotton | do | 13.8 | 10.9 | 13.6 | 19.7 | 21.3 | 23.5 | 24.8 |
| Nylon | do | 7.3 | 8.0 | 4.8 | 5.7 | 6.7 | .8 | 2.4 |
| Wool | do | | | | | | 3.6 | 3.7 |
| Other | do | | | | | | 2.4 | 2.2 |
| Skirts (dozen-priced) | Thousands | 21,540 | 23,736 | 34,884 | 53,268 | 57,408 | 54,720 | 62,352 |
| Rayon and acetate | Percent | 25.7 | 44.4 | 51.1 | 47.2 | 41.9 | 44.6 | 43.6 |
| Cotton | do | 5.7 | 7.1 | 10.7 | 25.3 | 29.9 | 31.3 | 31.1 |
| Nylon | do | 68.6 | 48.5 | 38.2 | 27.5 | 28.2 | .8 | .5 |
| Wool | do | | | | | | 22.8 | 23.4 |
| Other | do | | | | | | .5 | 1.4 |
| Suits (unit-priced) | Thousands | 17,491 | 14,091 | 14,963 | 16,652 | 18,048 | 18,178 | 16,365 |
| Rayon and acetate | Percent | 9.5 | 11.1 | 20.1 | 34.4 | 41.6 | 59.7 | 62.5 |
| Cotton | do | 1.4 | 2.3 | 3.5 | 1.6 | 1.8 | 1.5 | 2.8 |
| Wool | do | 89.1 | 86.6 | 76.4 | 64.0 | 56.6 | 37.8 | 33.9 |
| Other | do | | | | | | 1.0 | .8 |
| Untrimmed coats (unit-priced) | Thousands | 20,139 | 18,690 | 22,936 | 23,571 | 22,598 | 21,995 | 23,338 |
| Rayon and acetate | Percent | 1.5 | .9 | 1.2 | 3.8 | 9.5 | 22.1 | 13.1 |
| Cotton | do | .7 | .5 | .4 | .6 | 1.4 | 1.2 | 1.2 |
| Wool | do | 97.8 | 98.6 | 98.4 | 95.6 | 89.1 | 76.5 | 85.5 |
| Other | do | | | | | | .2 | .2 |
| Fur-trimmed coats (unit-prices. | Thousands | 1,685 | 1,923 | 2,368 | 2,044 | 2,105 | 1,907 | 1,717 |
| Rayon and acetate | Percent | | | | | | 7.3 | 7.2 |
| Cotton | do | | | | | | | |
| Wool | do | | | | | | 92.7 | 92.8 |
| Other | do | | | | | | | |

Source: Compiled from reports of the Bureau of the Census.

APPENDIX TABLE 19.—*Percentage distribution of specified items of children's and infants' outerwear by fiber content, United States, 1948–51*

| Item | 1948 | 1949 [1] | 1950 | 1951 |
|---|---|---|---|---|
| | *Percent* | *Percent* | *Percent* | *Percent* |
| Coats (including capes and reversibles) | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 2.9 | 2.9 | 3.5 | 3.8 |
| Rayon and acetate | 2.6 | 2.9 | 8.0 | 15.5 |
| Wool and other | 94.5 | 94.2 | 88.5 | 80.7 |
| Coat-and-legging and coat-and-snow pants | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 1.3 | 1.2 | 3.1 | 5.0 |
| Rayon and acetate | ---- | .1 | 1.4 | 5.8 |
| Wool and other | 98.7 | 98.7 | 95.5 | 89.2 |
| Ski and snow suits | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 43.7 | 36.9 | 32.7 | 25.6 |
| Rayon and acetate | 9.3 | 15.6 | 30.8 | 42.6 |
| Wool and other | 47.0 | 47.5 | 36.5 | 31.8 |
| Ski and snow pants and leggings | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 14.1 | 26.5 | 16.6 | 26.3 |
| Rayon and acetate | ---- | .1 | 1.6 | .7 |
| Wool and other | 85.9 | 73.4 | 81.8 | 73.0 |
| Suits (except ski and snow suits and slack suits) | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 11.2 | 15.6 | 25.0 | 23.1 |
| Rayon and acetate | ---- | 16.3 | 33.2 | 55.2 |
| Wool and other | 88.8 | 68.1 | 41.8 | 21.7 |
| Skirts | ---- | 100.0 | 100.0 | 100.0 |
| Cotton | ---- | 36.8 | 40.7 | 40.1 |
| Rayon and acetate | ---- | 5.6 | 10.7 | 16.1 |
| Wool and other | ---- | 57.6 | 48.6 | 43.8 |
| Slacks | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 77.6 | 82.0 | 83.6 | 84.2 |
| Rayon and acetate | 22.4 | 1.5 | 3.5 | 8.5 |
| Wool and other | | 16.5 | 12.9 | 7.3 |
| Slack suits | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 89.7 | 85.4 | 66.4 | 72.6 |
| Rayon and acetate | 10.3 | 3.8 | 10.0 | 13.3 |
| Wool and other | | 10.8 | 23.6 | 14.1 |
| Jackets | 100.0 | 100.0 | 100.0 | 100.0 |
| Cotton | 70.4 | 72.3 | 79.7 | 64.9 |
| Rayon and acetate | ---- | .5 | 8.5 | 23.1 |
| Wool and other | 29.6 | 27.2 | 11.6 | 12.0 |

[1] Derived from preliminary data.

Source: Derived from reports of the Bureau of the Census.

APPENDIX TABLE 20.—*Prices per pound of wool, and other textile fibers, United States, 1921–52*

| Year | Wool [1] | Cotton [2] | Rayon [3] | Acetate [4] | Year | Wool [1] | Cotton [2] | Rayon [3] | Acetate [4] |
|---|---|---|---|---|---|---|---|---|---|
| | *Cents* | *Cents* | *Cents* | *Cents* | | *Cents* | *Cents* | *Cents* | *Cents* |
| 1921 | 85.0 | 14.6 | ---------- | ---------- | 1937 | 101.9 | 11.8 | 27.1 | 52.2 |
| 1922 | 125.0 | 20.9 | ---------- | ---------- | 1938 | 70.4 | 9.0 | 25.0 | 46.5 |
| 1923 | 141.0 | 29.3 | ---------- | ---------- | 1939 | 82.7 | 9.3 | 25.0 | 46.0 |
| 1924 | 141.2 | 28.6 | ---------- | ---------- | 1940 | 96.3 | 10.2 | 25.0 | 43.0 |
| 1925 | 139.0 | 23.7 | ---------- | ---------- | 1941 | 108.8 | 13.9 | 25.0 | 43.0 |
| 1926 | 116.2 | 17.4 | ---------- | ---------- | 1942 | 119.1 | 19.3 | 25.0 | 43.0 |
| 1927 | 110.3 | 17.6 | ---------- | ---------- | 1943 | 117.8 | 20.6 | 24.0 | 43.0 |
| 1928 | 116.1 | 19.9 | ---------- | ---------- | 1944 | 119.0 | 21.2 | 24.4 | 41.9 |
| 1929 | 98.1 | 19.0 | 60.0 | ---------- | 1945 | 117.7 | 22.6 | 25.0 | 38.0 |
| 1930 | 76.2 | 13.2 | 60.0 | ---------- | 1946 | 102.6 | 30.6 | 25.4 | 39.1 |
| 1931 | 63.1 | 8.2 | 57.6 | ---------- | 1947 | 124.2 | 34.4 | 31.9 | 47.9 |
| 1932 | 47.0 | 6.3 | 45.8 | ---------- | 1948 | 164.6 | 33.8 | 36.4 | 48.0 |
| 1933 | 67.1 | 8.5 | 40.0 | ---------- | 1949 | 166.4 | 31.6 | 35.8 | 43.0 |
| 1934 | 81.6 | 12.4 | 34.6 | ---------- | 1950 | 199.2 | 36.2 | 36.1 | 42.5 |
| 1935 | 74.8 | 12.1 | 34.0 | ---------- | 1951 | 270.5 | 41.4 | 40.0 | 48.0 |
| 1936 | 92.0 | 12.3 | 30.4 | [5] 65.1 | 1952 | 165.3 | 38.8 | 39.5 | 42.4 |

[1] Territory fine good French combing and staple, scoured basis, Boston.
[2] Middling 15/16".
[3] Viscose 1½ denier.
[4] 5 denier.
[5] April–December average.

Source: Compiled from reports and publications of Bureau of Labor Statistics, Textile Economics Bureau, and U. S. Department of Agriculture.

APPENDIX TABLE 21.—*Apparel wool: Estimated world supply and disposition, average 1934–39 and 1940–45; and annual 1945–46 through 1952–53 season (grease basis)*

[In million pounds]

| Year [1] | Supply | | | Disposition | |
|---|---|---|---|---|---|
| | Carry-in stocks | Production | Total | Consumption | Closing stock |
| 1934–39 average | 1,825 | 2,991 | 4,816 | 3,103 | 1,713 |
| 1940–45 average | 2,961 | 3,291 | 6,252 | 2,580 | 3,672 |
| 1945–46 | 5,357 | 2,964 | 8,321 | 3,299 | 5,022 |
| 1946–47 | 5,022 | 2,982 | 8,004 | 3,530 | 4,474 |
| 1947–48 | 4,474 | 2,931 | 7,408 | 3,854 | 3,551 |
| 1948–49 | 3,551 | 2,965 | 6,516 | 3,528 | 2,988 |
| 1949–50 | 2,988 | 3,100 | 6,088 | 3,960 | 2,128 |
| 1950–51 | 2,128 | 3,115 | 5,243 | 3,384 | 1,859 |
| 1951–52 | 1,859 | 3,190 | 5,049 | 3,060 | 1,989 |
| 1952–53 | 1,989 | 3,320 | 5,309 | 3,300 | 2,009 |
| 1953–54 | 2,009 | ---------- | ---------- | ---------- | ---------- |

[1] Stocks are for July 1: Consumption applies to calendar year beginning halfway through the season; i. e. 1951–52 refers to consumption in 1952.

Source: Foreign Agriculture Service.

APPENDIX TABLE 22.—*Number of grazing units of livestock on farms and ranches in comparison with the number permitted on the national forests, 11 Western States, selected years, 1912–53*

[In thousands]

| Year | Grazing units of livestock on farms, 11 Western States, Jan. 1 [1] | | | Grazing units of livestock permitted on the national forests [1] [2] | | |
|---|---|---|---|---|---|---|
| | Sheep and lambs [3] | Cattle, horses, and mules | Total | Sheep and goats | Cattle and horses | Total |
| 1912 | 5,076 | 10,105 | 15,181 | 1,510 | 1,425 | 2,938 |
| 1915 | 4,620 | 12,613 | 17,233 | 1,457 | 1,680 | 3,137 |
| 1918 | 4,529 | 15,506 | 20,035 | 1,702 | 2,180 | 3,882 |
| 1920 | 4,284 | 14,325 | 18,609 | 1,463 | 2,052 | 3,515 |
| 1923 | 3,744 | 13,292 | 17,036 | 1,341 | 1,806 | 3,147 |
| 1925 | 3,963 | 12,115 | 16,078 | 1,233 | 1,553 | 2,786 |
| 1930 | 5,009 | 10,419 | 15,428 | 1,339 | 1,372 | 2,711 |
| 1931 | 5,231 | 10,607 | 15,838 | 1,317 | 1,386 | 2,703 |
| 1935 | 4,707 | 11,283 | 15,990 | 1,135 | 1,358 | 2,493 |
| 1940 | 4,262 | 10,431 | 14,693 | 988 | 1,185 | 2,173 |
| 1942 | 4,410 | 11,724 | 16,134 | 948 | 1,189 | 2,137 |
| 1945 | 3,423 | 13,010 | 16,433 | 774 | 1,186 | 1,960 |
| 1947 | 2,701 | 12,339 | 15,040 | 677 | 1,139 | 1,816 |
| 1948 | 2,566 | 12,171 | 14,737 | 661 | 1,129 | 1,790 |
| 1949 | 2,436 | 12,306 | 14,742 | 616 | 1,101 | 1,717 |
| 1950 | 2,306 | 11,992 | 14,298 | 599 | 1,066 | 1,665 |
| 1951 | 2,370 | 12,724 | 15,094 | 600 | 1,060 | 1,660 |
| 1952 | 2,509 | 13,950 | 16,459 | 598 | 1,069 | 1,667 |
| 1953 | 2,529 | 14,651 | 17,180 | | | |

[1] A grazing unit of livestock as used in this table equals 1 horse, 1 mule, 1 head of cattle and calves, excluding milk cows, or 5 head of sheep and lambs.
[2] Animals under 6 months of age are not included in these figures since they graze free of charge with the other livestock.
[3] Excludes sheep and lambs on feed.

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ADVICE AND COUNSEL OBTAINED IN DEVELOPING RECOMMENDED PROGRAM FOR THE DOMESTIC WOOL INDUSTRY

The program being recommended for the development of a sound and prosperous domestic wool industry has been developed after considerable study by the Department and with the advice and counsel of all segments of the wool-growing industry. Following is a list of the advisory and industry groups whose recommendations formed the basis for the program now before the Congress:

NATIONAL AGRICULTURAL ADVISORY COMMISSION

The purpose of this Commission is to review national agricultural policies and the administration of farm programs and to make recommendations to the Secretary of Agriculture for the betterment of such policies and programs. The Commission is predominantly composed of farmers. W. I. Myers, dean of the New York State College of Agriculture, is Chairman of the Commission. In addition to Dean Myers, other members of the Commission are:

Wiley W. Andrews, Goldsboro, N. C.
Robert D. Armstrong, Monmouth, Ill.
E. Frank Branon, Fairfield, Vt.
D. W. Brooks, general manager, Cotton Producers Association, Atlanta, Ga.
Delmont L. Chapman, Newport, Mich.
Homer R. Davison, vice president, American Meat Institute, Chicago, Ill.
James B. Hand, Jr., Rolling Fork, Miss.
Tom J. Hitch, Columbia, Tenn.
Chris Milkus, president, Nebraska Farmers Union, Omaha, Nebr.
Albert K. Mitchell, Tequesquite Ranch, Albert, N. Mex.
Mrs. Raymond Sayre, Ackworth, Iowa.
Don Stevens, vice president, General Mills, Inc., Minneapolis, Minn.

Milo K. Swanton, executive secretary, Wisconsin Council of Agriculture Cooperatives, Madison, Wis.
Ben Swigart, Mooreland, Okla.
Sterling J. Swigart, Sidney, Mont.
Jesse W. Tapp, executive vice president, Bank of America, San Francisco, Calif.
G. B. Wood, head, agricultural economics department, Oregon State College, Corvallis, Oregon.

A brief biographical sketch about each member of this Commission was given in a Department release, USDA 3061–53 in December 1953.

WOOL LEGISLATIVE ADVISORY COMMITTEE—CALLED BY SECRETARY BENSON, NOVEMBER 19 AND 20, 1953

John Breckenridge, Twin Falls, Idaho
Fred T. Earwood, Sonora Wool & Mohair Co., Sonora, Tex.
O. T. Evans, Wool Growers Warehouse & Marketing Co., Casper, Wyo.
James A. Hooper, Utah Wool Marketing Association, Inc., Salt Lake City, Utah
S. G. Lukens, Edgehill-Lukens, Inc., Boston, Mass.
Carl J. Nadasdy, Cooperative Wool Growers, Minneapolis, Minn.
Louis A. Rozzoni, Livestock Department, California Farm Bureau Federation, Berkeley, Calif.
Lawrence Ashworth, American Woolen Co., Lawrence, Mass.
Chandler Church, Elko, Nev.
J. Frank Dings, National Wool Marketing Corp., Boston, Mass.
L. A. Kauffman, Ohio State University, Columbus, Ohio
L. M. Pexton, American Stockyards Association, Denver Union Stock Yard Co., Denver Colo.
J. M. Jones, National Wool Growers Association, Salt Lake City, Utah
Garland Russell, Swift & Co., Chicago, Ill.
Everett Schwartz, Winslow & Co., Boston, Mass.
G. N. Winder, Craig, Colo.
J. Byron Wilson, Wyoming Wool Growers Association, McKinley, Wyo.

MEETING WITH LEGISLATIVE COMMITTEE OF NATIONAL WOOL GROWERS ASSOCIATION, JANUARY 19, 20, AND 21, 1954

Ray W. Willoughby, president, National Wool Growers Association, San Angelo, Tex.
Wallace Ulmer, vice president, National Wool Growers Association, Miles City, Mont.
Don Clyde, vice president, National Wool Growers Association, Heber City, Utah
S. P. Arbios, vice president, National Wool Growers Association, Stockton, Calif.
John H. Breckenridge, vice president, National Wool Growers Association, Twin Falls, Idaho
Robert Franklin, public relations counsel, National Wool Growers Association, Fresno, Calif.
J. M. Jones, executive secretary, National Wool Growers Association, Salt Lake City, Utah
L. M. Pexton, Union Stockyards, Denver, Colo.

MEETING WITH EXECUTIVE COMMITTEE OF NATIONAL WOOL GROWERS ASSOCIATION, FEBRUARY 12, 1954

Ray W. Willoughby, president, National Wool Growers Association, San Angelo, Tex.
John Noh, Kimberly, Idaho
J. H. Breckenridge, Twin Falls, Idaho
J. B. Wilson, McKinley, Wyo.
M. V. Hatch, Panguitch, Utah
Walter Pfluger, Eden, Tex.
Fred T. Earwood, Sonora, Tex.
Edwin E. Marsh, Salt Lake City, Utah
Brett Gray, Denver, Colo.
Wallace Ulmer, Miles City, Mont.
Everett E. Shuey, Montana Wool Growers Association, Helena, Mont.
S. P. Arbios, Stockton, Calif.
Robert Franklin, Fresno, Calif.

L. A. Espil, Litchfield Park, Ariz.
Victor W. Johnson, Oregon Wool Growers Association, Pendleton, Oreg.
J. M. Jones, Salt Lake City, Utah

USDA 3061-53

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
*December 1953.*

THE NATIONAL AGRICULTURAL ADVISORY COMMISSION

On July 20, 1953, President Dwight D. Eisenhower issued an Executive order establishing on a permanent basis the National Agricultural Advisory Commission. The order requires that the Commission have 18 members, not more than 9 of whom shall be members of any one political party, and that at least 12 be representative farmers from the several geographic sections of the United States. The Commission meets at the call of the Secretary of Agriculture at least once during each quarter of each calendar year.

The purpose of the Commission, as stated in the President's Executive order, is to: (1) Review the policies and administration of farm programs within the jurisdiction of the Department of Agriculture, or any part of such policies and administration, and such related matters as the Secretary shall determine, and (2) advise the Secretary in regard thereto. The new Commission replaces the 14-man interim Agricultural Advisory Committee which met with the Secretary in an advisory capacity several times following its appointment in December 1952.

As of November 24, 1953, all 18 members of the Commission had been appointed, 6 of them to serve until January 31, 1955; 6 to serve until January 31, 1956; and 6 to serve until January 31, 1957. Dr. William I. Myers, dean of the College of Agriculture at Cornell, has been named by President Eisenhower to be Chairman of the Commission.

The members of the Commission and a brief biographical sketch about each of them follows:

To serve until January 31, 1957—

E. FRANK BRANON, FAIRFIELD, VT. (DEMOCRAT)

Mr. Branon operates a 450-acre dairy farm near Fairfield, Vt., and has a herd of 125 dairy cattle. He has devoted a great deal of his time and effort in the best interests of marketing dairy products, particularly in the Boston area.

Mr. Branon has been a member of the Northern Farms Cooperative, Inc., for 15 years, and from 1938 to 1941 was manager of that cooperative. He has been a member of the Farm Bureau for 30 years and for 8 years has been a State committeeman working on the agricultural conservation program in Vermont.

For many years Mr. Branon has taken an active interest in the affairs of his town, county, and State, and has represented both his town and county in the State legislature. At the present time he is giving some time to the development of agriculture, industry, and recreation in Vermont.

TOM HITCH, COLUMBIA, TENN. (DEMOCRAT)

Mr. Hitch operates a 350-acre farm where he specializes in breeding Angus cattle. He also has long been active in all matters relating to tobacco production and marketing in Tennessee. He has served as a member of the Tobacco Advisory Committee under the Research and Marketing Act of 1946.

Mr. Hitch is president of the Tennessee Farm Bureau Federation and a delegate member of the National Cotton Council for Tennessee and Kentucky. He is a member of the board of directors for the Tennessee Farmers Cooperative, the Tennessee Producers Livestock Marketing Association, the Burley Tobacco Growers Association, the Tennessee State Board of Agriculture, and the Southern Farm Bureau Life Insurance Co. He is also president of the Tennessee Farmers Auto & Fire Insurance Cos., the Tennessee Rural Health Improvement Association, and is vice president of the Citizens for TVA, a newly organized group for supporting the Tennessee Valley Authority.

ALBERT MITCHELL, ALBERT, N. MEX. (REPUBLICAN)

Mr. Mitchell long has been directly interested in problems of the livestock industry, particularly the marketing phases of it. He owns large ranching interests near Albert, N. Mex. He is a member of the New Mexico Cattle Growers Association and has served as president of the American National Livestock Association, as director of the National Livestock and Meat Board, and as a member of the New Mexico Cattle Sanitary Board.

Since its inception in 1947 Mr. Mitchell has been chairman of the Industry Advisory Committee on Foot and Mouth Disease. He has also been a member of the board of directors of the Commodity Credit Corporation and of the USDA National Agricultural Mobilization Board. He was one of the original members of the 11-man National Agricultural Research Policy Committee which was established under the Research and Marketing Act of 1946.

WILLIAM I. MYERS, ITHACA, N. Y. (CHAIRMAN) (REPUBLICAN)

Mr. Myers has devoted nearly all of his life to agriculture as teacher, research worker, administrator, and farm operator. He was born on a farm near Lowman, N. Y., and spent the early years of his life there. He graduated from Cornell University in 1914. In 1920 he was appointed professor of farm finance and in 1938 he became head of Cornell's department of agricultural economics. Since 1943 he has been dean of the college of agriculture. For more than 30 years Mr. Myers has lived on and operated his 84-acre farm near Itahaca, N. Y., where he specializes in the production of eggs and poultry.

From 1933 to 1938 Mr. Myers was on leave of absence from Cornell to serve as Governor of the Farm Credit Administration. He had much to do with drawing up legislation creating the FCA and in establishing the regional offices now operating in the 12 farm credit districts. Other offices held or groups with which Mr. Myers has been associated are: President of the Federal Farm Mortgage Corporation; Director of the Federal Surplus Relief Corporation and the Commodity Credit Corporation; and he has served as a member of several State and national commissions concerned with agricultural problems.

Mr. Myers is a public director representing agricultulre of the Federal Reserve Bank of New York, as well as a trutsee or director of several philanthropic foundations and business corporations. He was also appointed by President Eisenhower as a member of the International Development Advisory Board.

Since 1947, he has been a member of the Department's Foreign Agricultural Trade Policy Advisory Committee which was established under the Research and Marketing Act of 1946.

On October 22, 1953, the President named Mr. Myers to serve as chairman of the National Agricultural Advisory Commission.

MRS. RAYMOND SAYRE, ACKWORTH, IOWA (REPUBLICAN)

Mrs. Sayre lives on a farm where her husband is a livestock producer. As a farm wife she has taken an active part in a wide range of local, national, and international organizations. Her parents were Iowa farmers and her grandparents were early settlers in that State.

She is immediate past president of the Associated Country Women of the World and is past president of the Associated Women of the American Farm Bureau, the American Country Life Association, and the Master Farm Homemaker Guild. During World War II Mrs. Sayre was a member of the President's National Committee on Civilian Defense, and is member of the present Women's Advisory Committee on Civil Defense. In 1949 she was on an official assignment in Germany for the United States Army.

Mrs. Sayre also serves as a representative of the American Farm Bureau on the United States Commission for UNESCO and has served as chairwoman of the home and family life board of the Iowa Congress of Parents and Teachers. She is also a member of the town and country committee for the Methodist Church. She served for several years on the Agricultural Research Policy Committee under the Research and Marketing Act of 1946 and is now a member of the Department of Agriculture's Advisory Committee on Foreign Agricultural Trade and Technical Assistance.

JESSE W. TAPP, SAN FRANCISCO, CALIF. (DEMOCRAT)

Mr. Tapp is executive vice president of the Bank of America in San Francisco. He is a native of Corydon, Ky. An agricultural economist, Mr. Tapp has wide experience with agricultural programs and enterprises. He holds a bachelor of science degree in agriculture from the University of Kentucky, and master of science in agricultural economics from the University of Wisconsin, and has done graduate work at Harvard University.

Mr. Tapp worked with the United States Department of Agriculture as an agricultural economist from 1920 to 1928, then as an economist with the National Investors Corp. until 1933. After that he became President and Director of the Federal Surplus Commodities Corporation and a member of the Board of Directors of the Federal Crop Insurance Corporation and of the Commodity Credit Corporation.

In 1939 Mr. Tapp became vice president of the Bank of America in San Francisco. This service was interrupted while he served briefly in the War Food Administration in 1943, and then as president of Axton-Fisher Tobacco Co. in Louisville, Ky., until 1945. Mr. Tapp was a member of the USDA Foreign Agricultural Trade Policy Advisory Committee under the Research and Marketing Act from 1947 through 1952. He also is a member of the American Farm Economic Association, the Academy of Political Science, and the Commission on Foreign Economic Policy.

To serve until January 31, 1956—

ROBERT D. ARMSTRONG, MONMOUTH, ILL. (INDEPENDENT-DEMOCRAT)

Mr. Armstrong farms about 440 acres of land near Monmouth, Ill., of which he owns 160 acres. He produces both grain and livestock and at the present time has about 240 head of feeder cattle and 150 hogs. Most of the grain produced on the Armstrong farm is fed to the cattle and hogs. He normally produces about 400 hogs each year.

Mr. Armstrong is now president of the Warren County Farm Bureau and has been a member of that organization for 17 years. During the past year he served as a member of the resolutions committee of the Illinois Agricultural Association and from 1941 until last April he was the town clerk of Hale Township. Mr. Armstrong was associated with the production Credit System of the Farm Credit Administration for 4 years before he started to farm in March 1940.

D. W. BROOKS, ATLANTA, GA. (DEMOCRAT)

Mr. Brooks has been general manager of the Cotton Producers Association ever since it was established in 1933. In 1951 he was elected president of the National Council of Farmer Cooperatives, having previously served the council in several capacities since 1938. He has long been active in all phases of agriculture as well as the cotton industry, in which industry he is widely known both in this country and abroad. He received his bachelor of science degree in agriculture from the University of Georgia.

Mr. Brooks is also a director and vice president of the American Cotton Cooperative Association; a member of the agricultural committee of the National Planning Association; a member of the national advisory committee of the National Cotton Council of America; and an industry adviser to the International Cotton Advisory Committee. From 1947–49 he was a member of the USDA Cotton and Cottonseed Advisory Committee under the Research and Marketing Act of 1946.

JAMES HAND, JR., ROLLING FORK, MISS. (DEMOCRAT)

Mr. Hand and associates grow about 1,800 acres of cotton and about the same acreage of grain, soybeans, and lespedeza hay. He also has a forestry tree farm of 4,000 acres. He is a leading advocate of mechanized farming and is said to have the lowest production costs of any farmer in the Mississippi Delta.

Mr. Hand is vice president of the Mississippi economic council, and a director of the Staple Cotton Growers Cooperative. He is also a member of the farm bureau and the delta council and has served on the State agricultural stabilization and conservation committee (formerly PMA committee). Mr. Hand was one of the original organizers and promoters in establishing the large nitrogen-fixation plant at Yazoo City, Miss. He has been a member of the Production Economics Committee under the Research and Marketing Act of 1946 and for

a short time was on the RMA Oilseeds and Peanuts Committee. He is a member of the Mississippi State Forestry Commission.

CHRIS MILIUS, OMAHA, NEBR. (REPUBLICAN)

Mr. Milius was born and raised on a farm and from 1915–41 operated a diversified farm in Jefferson County, Nebr., where he milked cows, fed a few cattle, raised hogs, and produced feed for this livestock.

During his early years as a farmer, Mr. Milius became interested in cooperatives. He served for 5 years as president of a local cooperative organization and 8 years as county chairman. For 12 years he was a district director for the Farmers Educational and Cooperative State Union of Nebraska, and a member of its State board for a comparable period. He is now serving his 13th year as president of this organization.

In addition, Mr. Milius has been a member of the Elevator and Oil Co. board and for 10 years has served on the board of the Farmers Union Cooperative Creamery Co. after having helped to organize and sell shares in that company. He has also served as chairman of the Jefferson County Taxpayers League. Mr. Milius, although not now an active farmer, still owns 490 acres of land.

DON A. STEPHENS, MINNEAPOLIS, MINN. (REPUBLICAN)

Mr. Stevens has been an employee of General Mills, Inc., at Minneapolis since 1924 and is now vice president of that organization. He also has a 4,000-acre farm near Devils Lake, N. Dak., where wheat is the main crop.

He is chairman of the agricultural committee of the Millers National Federation. He is a member of the Grain Advisory Committee under the Research and Marketing Act of 1946, and is also a member of the USDA Foreign Trade Advisory Committee.

When the International Wheat Council met in London in May 1952 to discuss renewal of the International Wheat Agreement, Mr. Stevens served as an adviser to the United States delegation. He again served in this capacity when the Council met in Washington in February of 1953.

G. B. WOOD, CORVALLIS, OREG. (REPUBLICAN)

Mr. Wood is head of the department of agricultural economics at Oregon State College, and was recently elected chairman of the board of trustees of the American Institute of Cooperation. He grew up in southern Oregon where he spent his summers working in pear and apple orchards and in fruit-packing plants. He attended Oregon State College to study agriculture and later, as a graduate student in agricultural economics at the University of Wisconsin, he did considerable work in poultry and dairy marketing, including a special study of the part itinerant truckers play in the marketing of eggs.

Since receiving his Ph. D. degree from Wisconsin in the early 1940's, Mr. Wood has held a number of positions. Among these were: Assistant director of research of the St. Paul office of the Farm Credit Administration; senior economist, United States Department of Agriculture, Washington, D. C.; professor at Purdue University, where he was in charge of teaching and research in agricultural marketing and management. At the same time he continued to work closely with poultry, dairy, and grain and feed marketing organizations.

Mr. Wood returned to Oregon State 2 years ago to head up the department of agricultural economics. He is a member of the national committee on agricultural policy of the Farm Foundation, the research and education committee of the American Institute of Cooperation, the United States Council of the International Conference of Agricultural Economists, and the advisory council to the agricultural commission of the American Bankers Association.

To serve until January 31, 1955—

W. W. ANDREWS, GOLDSBORO, N. C. (DEMOCRAT)

Mr. Andrews has been a farmer all his life. He now owns 3 farms totaling 135 acres, on which cotton, tobacco, corn, and wheat are produced along with about 25 acres of woods and some pasture. He lives on 1 of these farms, rents 1 to a tenant, and operates the third with hired help.

Mr. Andrews has been active in a wide range of farm and civic affairs for many years. He is chairman of the executive committee of the North Carolina State Grange, vice president of the North Carolina Cotton Growers Association,

director of the Wayne Dairy Farmers Cooperative, vice president of the Wayne County Fair Association, and for 3 years was president of the Wayne County Guernsey Cattle Club.

Mr. Andrews has served 3 regular and 2 special terms in the North Carolina Legislature, and for 30 years he has been a member of his county school board. He is also vice chairman of the North Carolina Prison Advisory Council

DELMONT L. CHAPMAN, NEWPORT, MICH. (REPUBLICAN)

Mr. Chapman has been operating the family farm near Newport, Mich., since 1928, first in partnership with his father and now in partnership with one of his sons. This is a diversified grain and livestock farm although Mr. Chapman specializes in breeding purebred sheep and exhibiting them at local and State fairs. He also feeds from 200 to 1,000 lambs a year, depending on the feed situation. Grain crops produced on the Chapman farm are corn, wheat, soybeans, and oats. Last year Mr. Chapman and his son operated this farm with less than 200 hours of hired help. Mr. Chapman studied animal husbandry and farm crops at Michigan State College.

For more than 20 years Mr. Chapman has taken an active part in a wide range of local and State organizations. He was a member of the board of directors of the Mount Clemens Sugar Beet Growers Association from 1930 to 1940. He has been a member of the board of directors of the Monroe County Fair Association since it was organized and is now the president of this association. He served as president of the Michigan Purebred Sheep Breeders Association from 1933 to 1950 and as president of the Michigan Livestock Improvement Association in 1949–50.

Mr. Chapman was a member of the board of managers of the Michigan State Fair from 1945–49 and he is now serving his second year as president of the Monroe district of the Michigan Cooperative Livestock Marketing Association. He also is currently serving as a member of the executive committee of the Michigan Agricultural Conference and as a member of the Monroe County agricultural agent's advisory committee.

HOMER R. DAVISON, CHICAGO, ILL. (REPUBLICAN)

Mr. Davison has been vice president of the American Meat Institute, Chicago, Ill., for 15 years and has been associated with the production and marketing of livestock all of his adult life. Born in the agricultural community of Marshall, Ill., Mr. Davison worked as a hired hand on livestock and grain farms in the summers during his college days. After graduation from the University of Illinois, where he majored in animal husbandry, he began his work in livestock marketing.

Mr. Davison became livestock commissioner of the Chicago Livestock Exchange more than 30 years ago. In cooperation with Federal, State, and county officials he helped to promote an educational program to stamp out tuberculosis in cattle and swine.

Other positions held by Mr. Davison include: Director of association management of the American Meat Institute, director of the department of livestock of the Institute, and his present position as vice president. His work with the institute has had to do with such livestock production problems as breeding, feeding, pasture improvement, and soil and water conservation. Mr. Davison has also devoted considerable time to developing and improving outlets for animal fats. He owns a farm and lives on it, but does not have time to devote himself to fulltime farming.

MILO K. SWANTON, MADISON, WIS. (REPUBLICAN)

Mr. Swanton has been a farmer all his life. He owns and operates a 94-acre dairy and livestock farm near Madison in Dane County, Wis., on which he has lived since 1919. He has long been active in agricultural cooperative work in his State, having first served as local secretary of the American Society of Equity in 1919. In 1922 he was the leader in organizing the Madison Milk Producers Cooperative Association and served as its first president. Mr. Swanton was also active in organizing the Wisconsin tobacco pool, and at the present time is a member of various marketing, service, and farm-supply purchasing cooperatives.

Mr. Swanton became executive secretary of the Wisconsin Council of Agriculture Cooperative in 1937 and since that time has held various other positions of statewide responsibility. From 1937 to 1940 he was secretary of the State board

of agriculture, and for 3 years during the war he served as general manager of the American Dairy Association of Wisconsin. He has been chairman of the Wisconsin centennial executive committee, a member of the advisory committee of the State labor relations board. At the present time Mr. Swanton is a director of the National Milk Producers Federation and a trustee of the American Institute of Cooperation. He has been president of the American Country Life Association for the past 2 years.

Earlier in his career Mr. Swanton did extension work for the University of Wisconsin and for 4 years served as an appraiser with the Federal Land Bank System.

BEN SWIGART, MOORELAND, OKLA. (DEMOCRAT)

Mr. Swigart has been a farmer nearly all of his life and in recent years has operated a 920-acre diversified farm with 2 of his sons. Wheat, alfalfa, and sweet clover are produced on this farm, along with about 720 acres of pasture. The Swigart's also have a herd of 80 purebred Herefords and 25 Jersey cows.

Mr. Swigart has taken an active part in various local and State agricultural organizations having served successively since 1916 as board member, secretary, and president of the Farmers Cooperative Trading Co., of Mooreland. He is vice president of the Farmers Cooperative Grain Dealers Association of Oklahoma, a director of the Woodward Production Credit Association, and has served on the farm credit board of Wichita since 1945.

Mr. Swigart is a charter member of the Woodward County Farm Bureau, and from 1934 to 1944 he was president of the Mooreland local farmers' union. Since 1950 he has been and still is the legislative representative of the Oklahoma Agricultural Cooperative Council. Mr. Swigart is a charter member of the Mooreland Community Creamery. He helped organize the Mooreland Community Hospital and served 8 years as a director of that institution.

STERLING J. SWIGART, SIDNEY, MONT. (INDEPENDENT)

Mr. Swigart has a 2,129-acre farm near Sidney, Mont. About 375 acres of this land is under cultivation and the remainder is rangeland. He produces wheat, barley, oats, and has about 30 acres of hay under irrigation. He also raises Hereford cattle, mostly purebreds, having nearly 60 head at the present time.

Mr. Swigart is a member of the Farmers Union, past president of his county agricultural planning committee, and for 7 years he has been a supervisor of the Richland County Soil Conservation District. He is chairman of his community agricultural stabilization and conservation committee and has also served on his county ASCC committee (formerly PMA Committee).

Mr. Swigart attended the Montana State Agricultural College at Bozeman and has served that college as a 4–H Club leader. He is 36 years of age. Both Mr. and Mrs. Swigart are still active in 4–H Club work at Sidney.

(See wool legislation advisory committee—called by Secretary Benson, November 19 and 20, 1953, pp. 434, 435.)

Senator MALONE. Now I am asking you all this to find out how we are going to become self-sufficient in the United States of America as near as we can in the production of wool, which is a strategic or critical material, and then how we are going to become absolutely independent in time of war in the Western Hemisphere.

Does that program of yours fit into that proposition?

Mr. MORSE. Yes, sir, it is not contemplated that with the other opportunities in agriculture that this may make us completely independent as far as wool is concerned. On the other hand, as I have already mentioned, it was recognized that there has been the development of competing fibers and that they are being incorporated into cloth in increasing proportions so that there is less dependence on wool.

However, wool is still considered a strategic material.

Senator MALONE. What has been our consumption of wool over the last 20 years, we will say?

Mr. MORSE. We are producing less than a third of our consumption in this country.

Senator MALONE. Let us go back to 1940. In 1940 we produced 471 million pounds of wool. How many sheep did you have in this country then?

Mr. THOMPSON. 1940?

Senator MALONE. Yes.

Mr. THOMPSON. Forty-six million stock sheep and lambs.

DECLINE IN PRODUCTION

Senator MALONE. 46 million sheep? What was the consumption of wool that year?

Mr. THOMPSON. I was trying to find it here. This particular table only goes back to 1942. Will that serve your purposes?

Senator MALONE. What did we consume in 1942?

Mr. THOMPSON. 561 million pounds. That is on a scoured basis.

Senator MALONE. Let us put it all on the same basis so we can understand it.

Mr. THOMPSON. All right, sir.

Senator MALONE. What I would like for you to do for the record, if you want to use these scoured figures and the raw wool basis as opposite and comparable figures, I thnk it would be helpful to the committee, but give us the figures, just a table, 1925 to and including 1953, as to the number of sheep, the number of pounds of wool produced each year.

Mr. THOMPSON. Do you want that both in the grease and scoured?

Senator MALONE. I think so, for comparison. That is the only two kinds of wool that you have as far as the normal market is concerned?

Mr. THOMPSON. Yes.

Senator MALONE. The consumption for each year, all in the same table. Then give the amount of imported wool for each year, and if you want to convert it to scoured wool, it is all right, but generally speaking you use the raw-wool figure, do you not?

Mr. MORSE. We could use the raw wool.

Senator MALONE. Then if you wanted to use the raw wool all the way through you might describe in a footnote just what you do so that the committee could understand it and it might be well just to have the population of the country in one of those columns in round numbers. Just give us a picture of this wool business from 1925 until the present time.

Mr. THOMPSON. We will be glad to do that.

Senator MALONE. We will not dwell on it here any longer because we have considerable ground to cover.

I want to point out to you before we leave this subject that about 500 industries are either in trouble or on the verge of it; the mineral industries are practically gone. You have the Government in the business, short amortization periods, loans to the industry, or guaranteed unit price. The Government is running the business just like a father runs a family, so that there can be no encouragement of private money flowing into the business.

So we have some kind of idea that we are buying friendship throughtout the world by dividing markets. If we take all the wool that Australia wants to sell us, then they can pay that 25½-cent duty and bring it in here and make a profit, and all that the Argentine

wants to sell us and any other country in the world. We must have some idea that we are influencing people.

But what we are concerned with here in this committee is how we are going to defend ourselves. At the moment, just to give you some idea how this thing works, we are getting 850,000 tons of manganese from India, which is one-half of our annual use. We will find out more about it in the next few days in testimony from men like General Wedemeyer, General Johnson. Therefore, you can get whipped while you are trying to find a manganese mine, or raise a new crop of sheep.

Now, we are going to get very inquisitive about this before we get through. We will find out where the ball is on this thing.

Mr. MORSE. Senator, we have a substantial number of our staff in the Department that are assigned the responsibility of cooperation with the Office of Defense Mobilization. We are very much concerned with defense matters and stand ready to be as helpful as we can.

Senator MALONE. You really believe that the way to encourage the maximum production of wool in this country is to set up 300 million pounds, or some such figure, which is about one-third of what we use; is that right?

Mr. MORSE. It has been about that proportion.

Mr. THOMPSON. 300 million is about a third. We have been producing about a third, taking shorn wool and pulled wool together. This figure of 300 million for shorn wool is larger than what we have been producing. Production of shorn wool in 1953 was only 230 million pounds.

Senator MALONE. According to our own figures, it is not as large, but it is slowly being pressed down by this free-trade arrangement. So now it may be a little larger than last year's production or the year before. This is 40 percent of the consumption?

Mr. THOMPSON. I think that is pretty close. We can get the exact figures.

Mr. RAWLINGS. The average production in the United States for the past 5 years, was about 122 million pounds scoured basis. This includes both shorn and pulled wool.

Senator MALONE. How does the scoured pound compare to the raw wool?

Mr. RAWLINGS. I think they use 44 percent. That is, for 100 pounds of grease you get 44 pounds on scoured basis.

Senator MALONE. In other words, it is about 2⅛ to 1 or 2 1/10 to 1?

Mr. RAWLINGS. That is about right.

The 5-year average for the annual average requirement is about 371 million pounds, scoured basis, I believe.

### VARIOUS AGRICULTURAL PRODUCTS STRATEGIC AND CRITICAL, SELF-SUFFICIENCY POSSIBILITY

Senator MALONE. Then would you care to comment generally on this statement and submit it for the record? You may go through it, product by product.

Mr. MORSE. I think, Mr. Chairman, if it might be included in the record that it would be largely self-explanatory. We have brought staff members here to respond to questions regarding the statement.

Senator MALONE. We will accept it for the record as part of your statement.

(The statement referred to was marked as an exhibit and is as follows:)

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
*December 22, 1953.*

HON. EZRA TAFT BENSON,
*Secretary of Agriculture, Washington, D. C.*

MY DEAR MR. SECRETARY: Under Senate Resolution 143, the Minerals, Materials, and Fuels Economic Subcommittee is charged with the responsibility to (1) Make a full and complete investigation and study of the accessibility of critical raw materials to the United States during a time of war; and (2) to study and recommend methods of encouraging developments to assure the availability of supplies of such critical raw materials adequate for the expanding economy and the security of the United States.

In covering the broad field of strategic and critical materials, agricultural products occupy a most important part. It is evident that the United States is self-sufficient in the great bulk of our agricultural product requirements in time of war. However, the list of strategic and critical materials compiled by the national stockpiling authorities includes numerous agricultural products such as extra-long stapled cotton, wool, coconut oil, castor oil, various tannin extracts, etc., which indicates that our Nation may be dependent either wholly or in part on foreign sources of supply.

The committee is interested in ascertaining exactly which of the agricultural products mentioned in the list of strategic and critical materials for stockpiling can be produced—

(*a*) In the United States, and

(*b*) By other nations in the Western Hemisphere, and

(*c*) To what degree the United States can become self-sufficient if it were to rely:

1. On its ability to produce in the United States.
2. On the ability of other nations in the Western Hemisphere.

In order to complete the studies of the committee it would be extremely valuable if we could have a comprehensive report on what has been done to provide substitutes for those agricultural products which must be imported for strategic purposes.

Certain products, including alcohol, can be produced. There are others.

I am enclosing for your information the list of strategic and critical materials for stockpiling. This list comprises only those items which are considered critical and necessary for stockpiling.

It might be helpful if your Department could cover the entire list of farm products.

I feel that this list is not quite complete and would appreciate the benefit of your advice as to which other materials are to be deemed strategic and critical and for which we may run short or rationed in time of war.

Since the time for the committee to render a report is fast drawing near, it would be deeply appreciated if you could do everything possible to render an early report to the committee.

Very truly yours,

GEORGE W. MALONE, U. S. S.

NOTE.—The Western Hemisphere is used in this connection as North, Central, and South America and adjacent areas.

G. W. M.

AGAR

Uses: Major use is as a bacteria-culture medium although it has other uses in the food industry, in dentistry, pharmacy, medicine, and as an emulsifier in some industrial applications.

1. Can material be produced in the United States?

The material is derived from certain types of seaweed (marine algae). It is only for its use as a bacteriological culture medium that it is classed as a strategic material. Most of the raw material for the bacteriological grade, presently manufactured in the United States, is from raw material harvested in Mexico.

2. Can material be produced in the Western Hemisphere?

The best product comes from Japan, which is probably due chiefly to the variety of seaweed available, and somewhat less to know-how in preparation. Suitable agar-agar must be clear, have low ash content, and be able to gel after sterilization. There is only one producer of the bacteriological grade in the United States and, as indicated above, most of the raw material obtained by this company during the post-War II years and at present is of Mexican origin.

3. Could the United States become self-sufficient in production?

While it has been reported that seaweed suitable for the bacteriological grade of agar exists along the Pacific coast, we cannot find that any estimates of these reserves have been made. For the 5-year period 1948–52, United States consumption and exports, both civilian and military, for all uses, averaged slightly under 85,000 pounds annually. If it became mandatory during a war emergency, solution of the problems that may arise in such case could doubtless be effected through the use of Government subsidies to provide boats, pay high wages to divers, and finance an expansion of the extraction facilities where the weed is processed and agar is extracted and purified to meet bacteriological culture medium specifications.

4. Can the Western Hemisphere become self-sufficient in production?

For a time, the American Agar & Chemical Co., the sole producer of bacteriological grade of agar, was able to import the seaweed from Chile, but a few years ago Chile shut off imports on the ground that the agar was needed in the South American markets. It appears probable that the same factors and incentives which might be used to increase production in the United States would be equally applicable to the entire Western Hemisphere.

Substitutes: So far as we know, no entirely satisfactory substitutes have been developed.

### EMETINE (IPECAC)

Uses: Principally in the treatment of amoebic dysentery, particularly in cases involving liver complications.

The drug emetine is obtained from the botanical epicac which is the dried root of *Cephaelis ipecacuanha*, which cannot be grown in continental United States. The plant grows wild in the forest floor of tropical regions in the Western Hemisphere. There is no possibility of domestic production in the United States. Supplies depend almost entirely upon prices offered for the collection of material from the wild growth, and there is no commercial growing even in the tropical South American countries.

Point 4 personnel in Nicaragua have experimented with Ipecac for several years in order to determine if this commodity, normally gathered from the wilds, could be grown under cultivation. The result of a recent publication of a semi-popular leaflet on the results of this experiment has stimulated interest among farmers in eastern Nicaragua to the extent that a number are growing this crop. It is too early to state whether this will make any difference in the amount of Ipecac, from which emetine is obtained, for stockpiling.

Substitutes: Chloroquin, diodequin, along with aureomycin and terramycin.

### HYOSCINE (SCOPOLAMINE)

Uses: Medicinal control of motion sickness; in anaesthetic compounds; treatment of Parkinson's disease.

Hyoscine (scopolamine) is obtained from a number of plants of the botanical family Solonacae, especially *Datura metal*, *Hyoscymus sp.*, and *Duboisia myoporoides*. None of these plants are cultivated in the United States, although *Hyoscymus sp.* and *Datura sp.* both could be grown in this country if the price situation warranted. Other solonaceous plants, as *Datura stramonium*, also contain small amounts of hyoscine and could be processed from native wild plants or from cultivated plants if the price situation warranted. The botanical source of hyoscine has shifted from time to time; however, it now appears that *Duboisia* species from Australia is the major source. A few plants of *D. myoporoides* have been introduced into tests in Florida; however, this species would require a long time to develop in sufficient quantities for a commercial source of hyoscine even if seed were imported and an incentive price offered.

Substitutes: Dramamine may be used for motion sickness, but produces an undesirable drowsiness and possible side effects. Other drugs are not adequate substitutes for hyoscine in the other uses.

OPIUM

Uses: As a source of morphine, codeine, and other narcotics for medicinal use.

1. Can material be produced in the United States?

Opium as such has never been produced in the United States. By agreement in the Geneva Conference, the United States prohibits the cultivation of the opium poppy (*Paparer somniferum*) and depends entirely upon foreign sources outside of the Western Hemisphere for supplies.

2. Be produced in other countries of the Western Hemisphere?

Opium as such is not produced commercially in the Western Hemisphere. Most, if not all, of the countries are operating under the Geneva Conference and prohibit the growing of poppies although there is some illicit traffic in the opium poppy and possibly in opium itself.

3. Does the United States have the ability to become self-sufficient in production?

During World War II and since that time considerable research has been undertaken to explore the possibility of growing the opium poppy and making a direct morphine extraction, avoiding the process of making opium. Methods have been developed and demonstrated for growing poppies as either a summer or winter crop and harvesting the crop with altered farm machinery for utilizing both the seed and the morphine-yielding capsule. Suitable varieties have been developed for field handling and satisfactory yield of morphine. A feasible process for commercial extraction of morphine from dried capsules has been developed through the pilot-plant stage, using some 50,000 pounds of capsule material produced in the agronomic and breeding experiments in Arizona and California. Through the Stockpiling Act, seed of a suitable variety has been increased by the Department in sufficient quantity to grow in 1 year sufficient poppies to produce our annual needs of morphine. This seed is being maintained under proper security arrangements for use in emergency. A selection and breeding program is being continued to improve the lines for superior seed yield and morphine content. All of this work is done under Bureau of Narcotics, Treasury Department, license since no commercial production of poppies is permitted in the United States by law. The United States could become self-sufficient in morphine production through the growing of opium poppies by diverting suitable land to the production in accordance with available information. Capsules could be available for extraction at the end of the first winter or summer growing season after planting. Processing plants for extraction of morphine from the capsules would have to be established.

4. Do other nations in the Western Hemisphere have the ability to become self-sufficient in production?

Poppies could likely be produced in many of the countries of the Western Hemisphere either as a winter or summer crop provided the proper seed could be supplied for this production. Also, it would be necessary to develop commercial extraction plants or introduce the method of opium making from the green capsules. Such a development would require revisions in understandings regarding the Geneva Conference.

Substitutes: Several synthetic pain-relieving compounds have been developed at times from nonvegetable sources, but none of these, apparently, have been fully accepted for all purposes by the medical profession as a whole.

PYRETHRUM

Uses: A principal ingredient of insecticides for the control of disease-bearing insects.

1. Can material be produced in the United States?

There is no commercial production of pyrethrum in the Uinted States. Considerable amount of experimental work has been done to develop pyrethrum as a cultivated crop in the United States and it can be grown in several parts of this country, but at a cost far exceeding that of material ordinarily imported. No planting stock is available.

2. Be produced in other nations in the Western Hemisphere?

Some commercial production of pyrethrum has been started in Venezuela, Ecuador, and to a more limited extent in some other South American countries and in some of the Central American countries. Extensive hand labor has been required in growing this crop, and it appears that it could be expanded in several of the South American countries provided sufficient guidance were given to direct the growing of the crop and a price incentive offered. Production efforts in

the South American countries as well as in Central America are on the increase, although Kenya Colony and the Belgian Congo in Africa continue to be the major sources of supply.

3. Does the United States have the ability to become self-sufficient in production?

Even with a price of pyrethrum flowers twice the current average price over the past several years, pyrethrum production could not be greatly stimulated in the United States and then only on a gradual basis as seed could be increased from imported sources of questionable adaptability to our soil and climatic conditions.

Substitutes: There has been much work done recently to develop new insecticides of which allethrin, developed by Department of Agriculture chemists, is the nearest substitute to pyrethrum. Pyrethrum still has special uses and there has not been a great reduction in pyrethrum requirements because of the development of new insecticides.

### QUININE

Uses: As an antimalarial medicine.

Quinine is obtained from the bark of various species of cinchona, principally *Cinchona ledgeriana*, not grown in any part of the United States. During World War II supplies of quinine from natural and cultivated stands of cinchona, yielding high content of quinine, were collected through an extensively developed program in South America, particularly Peru, and some of the tropical areas of Central America, particularly Guatemala, and the Western Hemisphere islands.

Interest in further work in this direction in the Western Hemisphere has generally subsided, partly due to regained accessibility to cinchona bark supplies from Java. Also, there has been much work done to develop substitutes for quinine and a number of these chemicals have largely replaced the use of quinine.

Substituted: Quinacrine hydrochloride (atabrine), chloroquin, and palubrine.

### QUINIDINE

Uses: For the medicinal treatment of auricular fibrillation (irregularly beating heart).

Quinidine is obtained from the *Cinchona sp.* bark where it is found in relatively low concentration. It is our understanding that no exact substitutes have been developed for quinidine and it likely will be necessary to go to production areas for cinchona for supplies. However, it is likely that the quantities required could be obtained from sources in the Western Hemisphere.

Substitutes: None.

### SHELLAC

Uses: As a sealant for primers in shells and cartridges; protective coating for wood patterns and electrical insulation papers; adhesive for binding mica, abrasive wheels, electronic tubes, and light bulbs. It is also used in printing and engraving inks, for stiffening of felt in hats, in phonograph records, and for coating leather and textiles.

1. Can it be produced in the United States?

Shellac is a wholly imported commodity coming entirely from Asia, with about 85 percent of the world's production coming from India. It is derived from the secretions of insects feeding on the sap of various trees of southern Asia. Incrustations (lac) are formed on the twigs, scraped off, dried, and processed to remove foreign material. Stick lac is gathered in India, Burma, and Siam, but practically all is brought into India for processing into shellac.

2. Can the commodity be produced in the Western Hemisphere?

Not to our knowledge.

3. Could the United States or the Western Hemisphere become self-sufficient in production?

As of this time, we do not think so.

Substitutes: Synthetic resins can be used instead of shellac for some purposes. Various protective coatings using petroleum, coal tar, and agricultural products as starting points have been developed and are readily accepted as substitutes for shellac in many applications.

CORDAGE FIBERS

The United States imports annually for domestic use approximately 400 million pounds of tropical hard fibers and 800 million pounds of semitropical soft fibers. These fibers include abaca, sisal, henequen, jute, kapok, burlap and other fibers produced from tropical or semitropical plants, none of which are grown commercially in this country.

*Abaca*

Uses: This fiber is used almost exclusively in marine cordage and nets which are exposed to sea water because of its high resistance to this form of deterioration. It is also used for making the strong flexible cable used in oilwell drilling, high performance ropes, wire rope centers, and pulp for specialty paper.

1. Can the commodity be produced in the United States?

Abaca cannot be produced in the United States because of climatic conditions. The Philippines is the principal source of supply although such Western Hemisphere countries as Costa Rico, Panama, Honduras, Guatemala, and Ecuador are now producing abaca to some extent. Central American plantings were expanded rapidly during World War II and contributed needed supplies to the United States when abaca from the Far East was shut off.

2. Can the material be produced in other nations of the Western Hemisphere?

About 20,000 acres of abaca are under cultivation in the Western Hemisphere. Practically all of this acreage is being produced by the United Fruit Co. in Central America under contract for the United States Government. Various soil surveys in Central America indicate there are possibly 50,000 acres of land suitable for abaca production if expansion should be necessary. Results of additional surveys in southeast Mexico indicate several areas as being fairly suitable for production. Areas in the so-called fog belt in Ecuador are likewise considered as potential abaca lands. The climatic conditions for the above areas are considered suitable. Abaca grows best where the atmosphere is warm and humid and the rainfall is abundant and evenly distributed. It cannot be grown successfully even in tropical regions where rainy seasons are followed by long dry season.

3. Could the United States become self-sufficient in production?

As indicated above the United States cannot become self-sufficient in abaca production because of the lack of proper climatic conditions.

4. Could other nations of the Western Hemisphere become self-sufficient in production?

The average annual imports of abaca for the period 1948–52 were 60,644 long tons; 44,491 long tons from the Philippines, 2,355 from Indonesia, 37 from other Asiatic countries, 13,664 from Latin American Republics and 97 from other countries.

A series of long-term experiments on abaca is being conducted by Department of Agriculture specialists in Latin America with funds provided by the Reconstruction Finance Corporation which was given primary responsibility for development and maintenance of abaca production in the Western Hemisphere under the provisions of the Abaca Production Act of 1950 (Public Law 683, 81st Cong.). Despite the long period abaca requires to reach maturity, some clear-cut results are being obtained from these long-term experiments. The adverse effects from high-water table have been established which has resulted in a more adequate drainage system being provided. Fertilizer tests indicate need for additional nitrogen and potash. Further experiments are being added to determine the amounts that profitably may be applied on different soil types. Experiments on methods for controlling the banana-root borer indicate that "tip over" losses may be reduced. A serious vascular disease, apparently "Panama wilt," is causing considerable damage in several areas, particularly in Honduras. Some of the new strains from seedlings or hybrids have been shown to be more resistant to the disease than the commonly grown variety. This development emphasizes the need for intensifying the plant-breeding program.

As pointed out above, land suitable for abaca production is available in Central America, parts of Mexico, and Ecuador. When the soil surveys were made, the land was classified as 1, 2, 3, 4, or 5. Classes 1, 2, and 3 were considered marginal. Approximately 50,000 acres in Central America were rated as 3 or better. No accurate estimate is available for Mexico and Ecuador.

Substitutes: Sisal and henequen are substitutes which can be used in an emergency although they have a considerably less service expectancy. Cable and rope would generally have to be larger and heavier to perform the same duty.

*Sisal*

Uses: Farm rope; baler, binder, and wrapping time; upholstery and padding; wire rope centers and reinforcement for paper and plastics.

1. Can the commodity be produced in the United States?

As in the case of abaca, the United States is dependent upon imports. The principal source of supply is British East Africa, although sisal is grown in Brazil, Haiti, Venezuela, and several other Western Hemisphere countries. Brazil, in particular, has greatly increased its production of sisal and now ranks second in total world production.

2. Can the commodity be produced by the nations in the Western Hemisphere?

The average annual imports of sisal for the period 1948–52 were 97,145 long tons. Less than half of this was imported from Western Hemisphere countries. Haiti, Brazil, and Venezuela produce practically all the sisal grown in the Western Hemisphere. The imports from the Eastern Hemisphere mainly come from British East Africa, Mozambique, Indonesia, and Western Portuguese Africa.

3. Can the United States become self-sufficient in production?

No, because of the lack of the proper climatic conditions.

4. Can other nations in the Western Hemisphere become self-sufficient in production?

Sisal production could be expanded in the West Indies and several Central and South American countries if prices were sufficiently high.

Substitutes: Henequen, istle, coir, cabuya, cantala, maguey and canton—all hard fibers. Hemp, jute, kenaf and cotton in the soft fiber group.

*Henequen*

Uses: Agricultural binder and baler twine, rope, and cordage.

1. Can the material be produced in the United States?

While henequen cannot be grown in the United States, it is one of the three principal cordage fibers and it is interchangeable with sisal in agricultural baler and binder twine.

2. Can it be produced in other nations of the Western Hemisphere?

Large quantities of henequen are imported from nearby Mexico which accounts for about 86 percent of the world's production. It is also grown in Cuba and El Salvador. The average annual imports of henequen for the period 1948–52 were 51,339 long tons. Practically all of this was imported from Mexico, Cuba, and El Salvador.

3. Can the United States become self-sufficient in production?

No, because of the lack of proper climatic conditions.

4. Can other nations of the Western Hemisphere become self-sufficient in production?

Henequen production during the past 20 years has been somewhat more constant than that of abaca or sisal. However, postwar crops have averaged lower with a gradual annual decline from the postwar high or 306 million pounds in 1948 to 246 million in 1952. Competition from an increasing production of sisal and the lower prices realized during the past year have caused distress in the henequen areas both in Mexico and in Cuba. It is probable, however, that during an emergency essential supplies of henequen could be obtained in the Western Hemisphere.

Substitutes: Sisal and abaca.

Research and experimental work conducted by the Department of Agriculture to provide substitute cordage fibers:

*Kenaf*

In the event of an emergency, sizable quantities could be produced in Cuba, Mexico, Colombia Haiti, and Guatemala. The studies on kenaf started in 1942 and rather extensive tests on the adaptation of kenaf were made in several Latin American countries and to a limited extent in Florida. It was found to be adapted to the Everglades of Florida and was believed to offer promise of a domestic source of a jute substitute.

In Cuba where commercial production was undertaken in 1950, 170,000 pounds of kenaf fiber and 130 tons of seeds were produced. The kenaf program inaugurated in the United States and in some other parts of the Western Hemisphere provided for the purchase of a substantial quantity of kenaf seed and a limited quantity of kenaf fiber from the 1951 crop. The purpose of the program was to place the United States in a position to expand production of kenaf fiber to meet essential needs should it become necessary. A secondary objective was to en-

courage the establishment of a spinning industry in this country. The kenaf production and purchase program was continued in 1952, but was discontinued in 1953. A satisfactory method for extraction of kenaf fiber continues to be a limiting factor in the economical production of this fiber under the existing Western Hemisphere conditions of labor availability and cost. The experimental work on fiber processing machinery has advanced to the point where large-scale production is possible, but much remains to be done in both experimental and developmental phases to increase the efficiency of production methods and make them economically feasible.

With the aid of funds for research on strategic fibers, planting work has continued to develop improved varieties with resistance to the different diseases, including colletotrichum tip-blight. Disease resistant strains have been selected and are being untilized in the breeding program. Other diseases of importance are nematodes and fusarium wilt. In addition cultural studies including variety tests, fertilizer tests, methods and rates of planting and dates of planting have been intensified.

*Sansevieria*

Sansevieria gives promise of providing an excellent substitute for abaca. We understand that the Navy feels that this is the best substitute so far developed because of the high quality marine cordage products which can be developed from it. Engineering research conducted since 1942 has indicated that the crop can be adapted to large-scale production. During recent months seedlings selections have been made from *S. trifasciata*, the species that has demonstrated the best possibilities for commercial fiber production. This species has been found superior because of its cold tolerance, its relatively long fiber and high yield per acre. Weed control was found to be a major problem after the plants began to spread between the rows. This difficulty, however, has been partially eliminated by the use of chemicals for weed control. As the plantings mature, the seriousness of the weed problem diminishes since thick mature stands offer little chance for weed growth. Estimated acre-yields are about 1,200 to 2,000 pounds annually from mature stands. The first harvest is expected in about 2½ to 3 years after planting. Many new plants arise from the old root stocks immediately after cutting and a new crop begins to develop.

Leaf-cutting equipment has been developed and alterations on transplanters made in mechanizing propogation. The Department of Agriculture presently has a 50-acre planting of sansevieria on Florida in order to develop and perfect production and harvesting equipment.

*Hemp*

In both World Wars rapid expansion of hemp production in the United States was necessary to provide a supplemental source of cordage fiber. Normally in peacetime only a small nucleus industry exists, and there are inadequate seed supplies available for quickly expanding fiber production. It would be desirable in the event of an emergency to have a sufficient stockpile of viable seed for immediate expansion for production. However, hemp seed under usual methods of storage will not give satisfactory stands after more than 2 years, and work with various other crops indicates that most crop seeds can be perserved many years by proper storage. On the basis of this experience, research was initiated to determine optimum storage conditions and the maximum period that it would be feasible to stockpile seed. Storage tests initiated under this project have shown to date that hemp seed can maintain its original viability after 5 years of storage under conditions of low seed moisture (6 percent) and low temperature (50 degrees F. or lower), while hemp stored at Beltsville was dead after 4 years.

Agronomic studies with hemp in Kentucky, Tennessee, Missouri and Mississippi indicate that fair to high yields of hemp fiber can be obtained on soils of medium fertility if drainage is good. Uniformity of growth and low yields seem to be major problems in this area. Current planting work is directed toward the development of strains with uniform maturity among plants.

Present commercial varieties have both male and female plants with the male plants maturing about a month before the females. This gives a fiber of different maturity and consequently lowered quality. This maturity difference is being eliminated by the breeding of strains where both male and female flowers occur on the same plant and thus all plants mature at the same time.

*Phormium*

Phormium is considered to be a satisfactory substitute for several cordage fibers and is also used extensively in New Zealand and other parts of the British Empire as a substitute for jute in the manufacture of burlap. This is the one hard fiber crop that grows well in the temperate parts of the United States. It has been found to be very well adapted to the Pacific Coast area between San Francisco, Calif., and Coos Bay, Oreg. Cultural and varietal studies are being conducted in this area along the coast. Preliminary results indicate planting material obtained by dividing crowns of old plants is most suitable. Late fall or early winter planting has been most successful, and chemical weed control in newly established stands appears promising. The main advantages of this crop appear to be (1) very high percentage of fiber in the leaves, (2) its adaptation to temperate climates of the United States, (3) the suitability of the fiber for cordage purposes as well as a jute substitute. Varietal and cultural improvement as well as processing problems need attention before an accurate evaluation of the possibilities of the crop can be given.

*Jute*

Uses: Burlap, bagging, cotton-bale wrapping.

1. Can the material be produced in the United States?

Jute is not produced commercially in the United States.

2. Can it be produced in other nations of the Western Hemisphere?

The average annual imports of jute for the period 1948–52 were 72,719 long tons. Only about 12 tons of this came from the Western Hemisphere. In addition, annual imports of manufactured jute products amount to about 250,000 tons. Practically all of the jute is produced in India and Pakistan. The manufactured jute products are imported from India and various European countries.

3. Can the United States become self-sufficient in production?

It appears advisable to grow kenaf as a substitute since it is better adapted to our soil and climatic conditions.

4. Could other nations of the Western Hemisphere become self-sufficient in production?

Brazil is the only country in the Western Hemisphere which produces any appreciable quantity of jute commercially. Labor supply and costs probably would not allow expansion to the extent of permitting large exports to other Western Hemisphere countries.

Substitutes: It has been demonstrated that kenaf is a satisfactory substitute for jute in the manufacturing of burlap and twine. It was produced on a commercial scale in south Florida as well as in other areas of the Western Hemisphere in 1950–52. Present production methods and high labor costs will not permit domestic kenaf production in competition with imported jute. Kenaf could be produced in the southern United States, Cuba, Mexico, and various Latin American countries in an emergency, provided sufficiently high price incentive guaranties were made and the necessary viable seed were available. Varietal improvement and cultural studies are underway and could be continued. The development of improved harvesting and processing methods also is essential.

FOREST PRODUCTS

*Vegetable tannins*

Uses: Chestnut—principally tanning of hides and skins; to lesser degree in treating boiler water and in chemical industry. Wattle—same as chestnut tanning. Quebracho—tanning of hides and skins and mud treatment in drilling oil and gas wells.

1. Can material be produced in the United States?

The chestnut tree formerly supplied a greater part of the vegetable tannin in this country until the blight disease wiped out the trees. The supply of chestnut wood extract, largely from the dead trees, has declined to the point that only 10 percent of our annual industrial supply is provided from that source. American chestnut wood is steadily decreasing and offers only short-term supplies. Utilization of remaining timber at a faster rate is possible but would involve serious production difficulties. There is no possibility of increasing this source of raw material since the chestnut blight disease has depleted practically all natural stands in the United States.

Development of other sources of tannin seems to offer better opportunities for increasing tannin supplies. The bark from a variety of native tree species such as oak, hemlock, and Douglas-fir is rich in high-quality tannin. Existing knowl-

edge indicates that bark from western hemlock and Douglas-fir may be the most promising sources of tannin because of the type of extract derived from the bark and the relatively abundant bark supplies. Further development of processes and construction plants would be required.

Perhaps most important is the possibility of developing cultivated sources of tannin materials. Canaigre (*Rumex hymenosepalus*), a species of native dock with tuberous roots, contains 30 to 35 percent tannin (dry-weight basis) and is the most promising domestic source of vegetable tannin if established as a domestic farm crop. The volume of material available from wild plants would be insignificant and impractical even for emergency use. Research underway since 1950 has developed canaigre from a wild plant existing only in the dry valleys of southwestern United States to experimental field plantings that have totaled more than 100 acres. However, there is no commercial production of canaigre. Any commercial production will require an increase of planting stock of a selected desirable type and the industrial development of processing plants to make the tannin extract. Domestic growing of canaigre cannot be undertaken until processing facilities are established in the areas where production would be undertaken, which now appears to be in the irrigated valleys of Arizona. The experimental work to develop improved lines and develop agronomic information on how to grow and handle the crop is continuing.

Sumac is another possible source of tannin. In this shrub the leaves are the source of tannin, and the tannin content, depending on species, varies between 19 and 39 percent. Planting trials have shown that at least *Rhus copallina*, *Rhus glabra*, and *Rhus typhina* can be grown under cultivation.

Synthetic tannings have also been developed which are usable commercially, but while the future availability of such materials is promising, the major disadvantages during a war emergency would be comparatively higher costs and the fact that the synthetics are produced from other critical war materials such as phenol, creosole, formaldehyde, or furfural.

2. Can material be produced in other nations in the Western Hemisphere?

Chestnut wood and canaigre seem to have no possibilities for development at other locations in this hemisphere. Quebracho tannin from processing mature trees is an important source of tannin from Argentina and Paraguay. Currently about 65 percent of our annual tannin requirement comes from quebracho. Trees 100 to 200 years old are utilized in obtaining quebracho tannin, so that this is not an inexhaustible source. Stands in Argentina are now being rapidly depleted and it is apparent that the future supply from this source is limited.

Wattle bark and extract are obtained from leguminous trees, principally in Africa. No large supplies of wattle bark are available in the Western Hemisphere. Approximately 15 percent of our total vegetable tannins for heavy leathers now comes from wattle bark.

3. Does the United States have the ability to become self-sufficient in production?

The United States can only become self-sufficient in the production of vegetable tannins by exploiting a new source of tannin materials, or developing a farm crop that will yield vegetable tannin. Canaigre is the only plant that gives great promise for developing a farm crop. Sumac could be utilized for very limited supplies for the lighter leathers, but at a high cost. Other sources of vegetable tannin, such as the bark of hemlock, Douglas-fir, and mangrove have been investigated. It is believed the United States has the capacity to become eventually self-sufficient in tannin extracts through use of sources such as the bark of hemlock and Douglas-fir. The supply of chestnut wood is being rapidly exhausted and even if disease-resistant varieties of trees could be developed, a tannin supply from that source would be from 50 to 100 years away.

4. Do other nations of the Western Hemisphere have the ability to become self-sufficient in production?

Many surveys have been made to determine new sources of vegetable tannins, none of which have yielded much encouraging information.

Substitutes: Many advances have been made in the development of chrome tans and other chemical tanning processes. Chemical tanning compounds are utilized extensively; however, apparently there has not been developed a material that can completely take the place of vegetable tannins.

A method of extracting high-grade tannin from canaigre (see question 1) has been developed and when tanned in experimental leathers has proven to be as satisfactory as imported vegetable tannins such as quebracho.

OTHER FOREST PRODUCTS

*Cork*

The cork industry in the United States is entirely dependent upon foreign sources of cork supply. Cork imports serve not only domestic needs for cork products but cork processors supply a number of foreign markets as well, principally in the Southern Hemisphere. In the period 1946–50 the United States imported annually about 140,000 tons of cork, obtained from approximately 5 million acres of cork oak forests which border the Mediterranean Sea in Portugal, Spain, Italy, Tunisia, French Morocco, and Spanish Morocco.

There is ample evidence that most, if not all, United States cork needs in time of emergency could be satisfactorily supplied through use of substitutes. There is hardly a use today for which substitutes are not available, and in fact have not already captured formerly important cork markets. Cork board is considered the most efficient material for thermal insulation, for example, but substitutes such as mineral wool board, chemically processed cane fiber board, rock and glass wools, hair felt, woodpulp board, and others have been developed and successfully used commercially. There are many other satisfactory insulation materials such as mineral wools, balsam wood (wood fiber between layers of paper), dry zero (kapok between burlap or paper), masonite (wood fiber board), sponge rubber and thermax (shredded wool fibers and cement). For gaskets, substitutes such as asbestos along with rubber, paper, felt base, and metal have proved satisfactory. Noreseal has been developed by the Agricultural Research Administration as a substitute for cork in beverage crowns, which in the past has been one of the most important uses of cork.

*Imported woods*

There are a number of woods considered of strategic importance in World War II for which the United States is entirely dependent upon foreign countries as sources of supply. These include teak, mahogany, lignum vitae, and balsa.

*Teak*

Teak supplies are available from Burma, Thailand, French Indochina, British Malaya, and the Netherland Indies. For the period 1946–50 annual teak imports amounted to about 440,000 board feet. Teak imports are used largely for ship decking. The principal properties which make teak desirable for ship and boat construction are resistance to wear, freedom from splintering and resistance to decay. Several native species of wood such as baldcypress, Douglas-fir, white ash, and black gum probably could be used as a substitute for teak in the event of an emergency.

*Mahogany*

Mahogany imports have been obtained mainly from Central America and northern South America. In addition, substantial quantities of Khaya or African mahogany have been imported into the United States from the coastal regions of the Gold Coast, Ivory Coast, and Nigeria in western Africa and used interchangeably with mahogany.

For the period 1946–50 annual mahogany imports including Khaya amounted to about 70 million board feet. These imports were used principally for furniture manufacture. However, in World War II mahogany was used for boat planking, aircraft plywood, airplane propellers, foundry patterns, and other war items.

The principal properties which make mahogany desirable for war uses are low shrinking and swelling coefficients, sufficient hardness to resist considerable abrasion and indentation, and resistance to splitting and driving nails and screws. Several domestic species of wood such as baldcypress, oak, birch, and hard maple might be used as substitutes for mahogany in most uses in the event of a national emergency.

It is probable that large supplies of mahogany are still available in Central and South America, and with adequate exploration and development of logging operations, it is possible that production in that region could be substantially expanded.

*Lignum vitae*

Lignum vitae is found principally in the coast regions of Central America and West Indian Islands. For the period 1946–50 annual lignum vitae imports amounted to about 510,000 board feet. The most important use of lignum vitae is for stern tube bearings in all types of oceangoing vessels. This wood is particularly suited for this use since it is naturally hard and contains a gum resin which acts as a natural lubricant. Lignum vitae may not be essential for this

use, however, since several substitutes—mostly phenolic resin, plastics such as micarta, textilite, and ryerite—have been developed.

*Balsa*

Ecuador in the past has been the most important source of United States imports of balsa. In the period 1946–50 imports of balsa wood amounted to about 5.5 million board feet annually. It is believed that substantial quantities of balsa could be obtained, largely from Ecuador, in the event of another emergency.

Balsa is characterized by extremely light weight and relative freedom from splintering, and it is widely used for liferafts, buoys, and other floats. It has the disadvantage, however, of absorbing moisture unless adequately waterproofed and of decaying easily unless kept dry or given preservative treatment. There is no native wood that can be produced which is as light as balsa. However, substitutes are available, such as hollow floats made from native woods, bubble glass, and foamed plastics, for nearly all purposes for which balsa is currently used.

CASTOR OIL

Uses: It is one of the most widely used industrial vegetable oils, either as such or in the form of derivatives, having applications in paints and varnishes, soaps, nylon plastic, synthetic resins, hydraulic brake fluids, waxes, ointments, and in the preparation of cotton textiles to be dyed. It is an excellent lubricating and cutting oil having a stable viscosity over a wide temperature range.

1. Can the material be produced in the United States?

The United States is the world's leading importer and consumer of castor beans and oil. Apparent domestic disappearance, including additions to the national stockpile, has been around 175 to 180 million pounds annually in recent years. Consequently, domestic production at the present level represents about 15 percent of disappearance, including stockpiling. Prospects are good for expansion of castor production in the United States.

Castor beans for oil were grown in the United States in a very limited production program during World War I and again in World War II. During World War I considerable research was undertaken to locate regions of adaptability and to develop improved lines suitable for domestic production. After World War II when castor oil was declared an important strategic item for use in plastics, drying oils, hydraulic mechanism fluids, cold weather greases, high temperature lubricants, and many other industrial uses, a more comprehensive research program was undertaken to provide agronomic information on growing the crop, improving varieties suited to specific areas, and developing suitable machinery for planting, harvesting, and shelling castor beans. In 1951 commercial production of castor beans was initiated in the United States under the procurement program sponsored by the Munitions Board and carried out by the Department of Agriculture. In 1951 the acreage was slightly over 8,000; in 1952, 120,000; and in 1953, 150,000.

Since the production program has been underway, rapid progress in the research field has been made by developing improved castor-bean varieties, including hybrids, and improving castor-bean machinery for planting, harvesting, and hulling for more economical and cheaper production. The current research program promises further improved varieties for yields and mechanized handling and machinery developments that should make it possible to expand the castor-bean acreage into new areas of production of such magnitude that might provide our total domestic need if sufficient incentive is provided.

The production program in 1953 assured growers a minimum price of 9 cents per pound, hulled basis. The minimum price for 1954 has been established at 6 cents per pound, and it is unlikely that the 1953 acreage will be expanded or even maintained if prices of competitive crops remain at the present level. Potentially all of the castor oil now used in the United States could be produced from domestic production. However, it must be done on a gradual basis with varieties of known performance in the areas. If domestic production is not maintained for seed supplies, it would be impossible to go into full production by use of seed from outside sources. The acreage of castor-bean production is now largely in New Mexico, Oklahoma, Texas, California, and Arizona with some production in Arkansas and Missouri.

2. Can material be produced in other nations in the Western Hemisphere?

Brazil is the origin of the bulk of beans and oil imported into the United States, accounting for about 75 percent of the total in 1950 and 1951 and 47 percent in 1952. India supplied about 15 percent in 1950 and 1951 and 26 per-

cent in 1952, about 5 to 10 percent from other Western Hemisphere countries, principally Ecuador and Haiti. Producers in Brazil and other Western Hemisphere countries, including Ecuador, Haiti, and Mexico, likewise with sufficient incentive, could increase production to meet United States demand.

3. Can the United States become self-sufficient in production?

With a continuing research program to make the most use of current material to further develop improved and disease-resistant varieties for more economical production and further improve castor bean harvesting machinery, the United States could become self-sufficient for castor oil if sufficient incentive is provided.

During 1951, the United States Department of Agriculture, at the request of the Munitions Board, undertook a program to encourage domestic production of castor beans. This program is still in operation. At the present stage the production of the crop is not on an established commercial basis and to a considerable extent it is dependent on Government programs.

4. Can other nations in the Western Hemisphere become self-sufficient in production?

Brazil accounts for 35 to 40 percent of the world production of castor beans and substantial additional quantities are produced in Haiti, Ecuador, and Mexico. These countries are more than self-sufficient, the bulk of production being exported to the United States. The harvest depends to a considerable decree on prices at harvesttime, as much of the crop comes from uncultivated plants. Thus, when demand and prices are high, output in these countries is capable of extensive expansion.

Substitutes: A considerable amount of work has been undertaken to develop substitute materials for derivatives of castor oil in many of its industrial applications. In the Department, most of the chemical work on the use of vegetable oils as substitutes has been discontinued. However, laboratory work in connection with naval stores investigations is continuing; it demonstrates the possibility of producing dibasic acids from various sources, among them turpentine, the esters of which can serve as lubricants to replace castor oil.

Other oils (tung, linseed, soybean) can replace dehydrated castor oil in most paint and varnish applications but at somewhat higher cost because of necessary modifications. Chemical substitutes can be adapted for use as hydraulic fluid. Azelaic acid, produced from animal fats, appears to be a possible substitute for sebacic acid which is required for the nylon plastic outer coating on combat field wire and in synthetic lubricants for jet engines. For the several hundred miscellaneous uses of castor oil, semisatisfactory substitutes can be utilized if necessary.

In general, chemical studies by industrial concerns have resulted in more extensive use of castor oil derivatives rather than fewer uses or substitute items.

### COCONUT OIL

Uses: In the United States coconut oil is used principally for laundry, household, and toilet soaps; specialty food products, lauryl alcohol, synthetic detergents, disinfectants, and as a source of coconut oil fatty acids for napalm.

1. Can it be produced in the United States?

There is no commercial production of coconuts in the United States. Our chief source of supply is the Philippines, as a result of preferences on tariff duties and processing taxes. Coconut oil is produced from copra, the dried meat of the coconut. Its principal use has been for the manufacture of soap, due to its lathering qualities imparted by its content of lauric acid. The coconut palm is found on the beaches of tropical southern Florida, to some extent along the gulf coast, and in southern California. In none of these places does it occur in any quantity, nor does it supply nuts for the oil industry. Any nuts which enter commercial trade are largely for the tourist trade or for fresh coconut meat and milk.

2. Can it be produced in the Western Hemisphere?

Coconuts grow in Mexico, some South American and Central American countries, but very small quantities are exported. Although the coconut palm grows abundantly in the tropical areas of Latin America, copra has not been produced there in any appreciable commercial quantity. There are no official figures available on commercial production from palms grown in the Western Hemisphere.

3. Could the United States become self-sufficient in production?

Annual domestic consumption of coconut oil ranges from 525 to 550 million pounds. The Western Hemisphere could not at the present time supply the needs of the United States for coconut oil if all other areas were cut off.

4. Can other nations of the Western Hemisphere become self-sufficient in production?

It is not likely that the United States or the Western Hemisphere will become self-sufficient in coconut production because of climatic conditions and the time element. The trees do not begin to bear until the sixth or seventh year. Accordingly, we are largely dependent on the Far East for this stockpile item. The principal exporting areas are the Philippines, Indochina, Malaya, and Ceylon.

It appears that the price incentive at present is too low to cause plantations of coconut palm to be established anywhere in the Western Hemisphere, although the palm will grow well in large areas of coastal Brazil and Central America.

Substitutes: Oils which compete closely with coconut oil are the African palm and babassu oil.

Babassu grows wild in Brazil and is harvested when the price is sufficiently high. In 1939 the United States imported 72 million pounds of babassu oil and the oil equivalent of babassu kernels. In the 3 years 1949–51, United States average imports were less than 40 million pounds. However, in 1952 only 2 million pounds were imported and none in 1953.

Limited quantities of African palm oil are produced in Central America.

Synthetic detergents, while using some coconut oil, are largely derived from nonfatty materials. They have replaced soap and thus indirectly coconut oil to a considerable extent. Synthetic detergent sales are already over 50 percent of the soap and synthetic detergent market. The new cold-rubber process in contrast to the older hot-rubber process in synthetic rubber manufacture does not require lauryl alcohol thereby reducing the demand for lauryl alcohol and indirectly for coconut oil.

### PALM OIL

Uses: In the United States palm oil is now used almost entirely as a fluxing dip in the manufacture of tin and terneplate and the cold rolling of steel.

1. Can it be produced in the United States?

The palm oil of commerce is obtained from the fruit of numerous varieties of the African oil palm (*Elaeis guineensis*). It is a strictly tropical palm which cannot be grown in the United States except in extreme southern Florida, an area too small to be of much significance commercially. United States imports of palm oil have been as high as 411 million pounds per year (when large quantities were used for soapmaking and in edible products), coming from the Belgian Congo and Indonesia. However, imports in recent years (which include oil for the Government stockpile) have averaged only about 60 million pounds; imports in 1953 totaled only 36 million pounds.

2. Can it be produced in other nations of the Western Hemisphere?

The oil palm will grow very successfully in tropical parts of the Western Hemisphere.

Central American countries have shown considerable interest in the African oil palm. Plantings in Panama, Costa Rica, Nicaragua, Honduras, and Guatemala totaled about 15,000 acres in 1950. Fruiting generally begins in the fourth year but the commercial bearing stage is not reached until the fifth year.

3. Could the United States become self-sufficient in production?

The United States could not become self-sufficient, due to the lack of proper tropical climatic conditions in all areas except the southern tip of Florida.

4. Could the Western Hemisphere become self-sufficient in production?

While there is no possibility of the United States becoming self-sufficient in palm oil, with proper incentives the Western Hemisphere could produce its essential requirements, given sufficient time to expand the number of producing trees.

Substitutes: A product has been developed from inedible fats now in surplus, which it has been demonstrated in practical tests will serve as a palm oil substitute for lubrication in the cold rolling of steel and in the "hot-dip" tinplating of steel sheets.

Also animal fats such as lard, tallow, and white grease (a grade of hog fat) when slightly modified are satisfactory tinning oils for the "hot-dip" tinplating.

### SPERM OIL

1. Can the material be produced in the United States?

Practically no sperm whales are obtained by the United States fishing industry. A few occasionally are brought in at Pacific coast points, but they are not a significant factor. In the past 20 years the volume of sperm oil imported into

the United States has ranged from 2 million pounds in 1932 to about 43.5 million pounds in 1951. The price of sperm-whale oil is highly speculative, depending upon the number of whales killed throughout the world during any whaling season.

2. Can material be produced in other nations in the Western Hemisphere?

Western Hemisphere production of sperm oil is relatively small and is presently confined mainly to Chile, Peru, Canada, and Argentina. In 1951 and 1952, Panama was engaged in pelagic whaling in the Antarctic and in 1951 off the coast of Peru. In 1953, production of sperm oil by these countries probably approximated the 1952 output of 5,500 short tons, of which 3,900 tons was produced by Chile.

As sperm whales are abundant off the coast of Peru and Chile, the number of whales taken in these waters can be increased substantially. In 1951, the high prices offered for sperm oil induced extensive factory-ship operations in these waters and a subsequent production of more than 25,000 tons of sperm oil. Thus, it is probable that United States sperm oil imports, which amounted to about 20,000 tons in both 1951 and 1952, mainly from Norway, if necessary, could be met solely from whales taken off the coast of Peru and Chile.

World production of sperm oil in 1953 is estimated roughly at 50,000 tons, as compared with about 80,000 tons in 1952 and nearly 120,000 tons in 1951. The reduction in the world outturn in the past 2 years is due mainly to low prices, relatively large stocks and increasing operating costs.

3. Substitutes: There has been considerable industrial interest in the oil from the seed of a wild shrub (simmondsia) which grows native in southwestern United States and adjacent Mexico. It has been said that the oil obtained from this plant's seed so closely approximates sperm-whale oil that it could, if available, almost completely replace sperm-whale oil on the market. The Department of Agriculture has asked for funds to undertake research on the crop development of this oil plant and to investigate the commercial possibilities of economically substituting simmondsia oil for sperm-whale oil.

### TUNG OIL

Uses: Tung oil is at present used almost exclusively as a high quality drying oil primarily in paints and varnishes.

1. Can it be produced in the United States?

The tung crop is an established commercial crop in the United States in a 100-mile wide belt along the Gulf of Mexico coast reaching from Florida into east Texas. The tung industry has expanded continuously and rapidly through periods of heavy imports, war, embargo (Chinese), etc., which resulted in widely fluctuating prices. The Agricultural Act of 1949 established mandatory price support for tung at between 60 to 90 percent of parity. The administration has proposed that tung now be removed from the mandatory category.

Annual domestic production of tung oil in 1952 and 1953 was over twice the annual average consumption during the World War II years of 1942–45 inclusive. In 1953 there were approximately 15 million trees in tung orchards in the southern United States. It is estimated that there were 132,100 and 144,900 tons of whole fruit produced in these orchards in the crop years of 1952 and 1953, respectively, from which would be recovered 21,000 and 24,000 tons of oil.

2. Can material be produced in other nations in the Western Hemisphere?

Tung oil can be produced successfully in the Western Hemisphere, especially by such countries as Argentina, Brazil, and Paraguay. Tung oil production in Argentina has increased rapidly in recent years and by 1953 has according to estimates amounted to 17,000 tons of oil. In that country, tung oil production in 1952 was only 4,960 tons for the reason that the crop was damaged by frost. In all three countries, Argentina, Brazil and Paraguay, tung oil production is expected to increase in the near future.

3. Does the United States have ability to become self-sufficient in production?

Tung oil consumption during the past 3 years has averaged around 50 million pounds annually, compared with earlier use of more than 100 million pounds. Thus, the United States is virtually self-sufficient in tung oil at the current consumption rate.

Tung oil production in the United States has been expanding for several years and a record production of 47.5 million pounds is estimated for the 1953–54 crop. It is reasonable to expect an annual production of at least 25,000 tons of oil during the next 5 years. With new trees yet to come into bearing, and the development of higher-yielding and more frost-resistant varieties, the industry

is now capable of producing more than 50 million pounds of oil per year without further expansion in acreage. Should there be the necessity for still greater production, suitable land in sufficient quantity is available, we have the plant materials, and the scientific knowledge as to production requirements, so that within a period of 5 to 8 years from the starting of the program production could be increased to 40,000 to 50,000 tons of oil.

To effect a greatly increased production, labor, machinery, fertilizer, and cover-crop seed would have to be available, and the price would need to be attractive.

4. Can other nations in the Western Hemisphere become self-sufficient in production?

While tung-oil production has risen rather steadily to its present level, the danger of excessive frost damage and short crops still exists. There is, however, a growing tung industry in Argentina with a production of about 35 million pounds of oil for export in 1953. Paraguay and Brazil raise the exportable supplies in the Western Hemisphere to around 50 million pounds. This is produced essentially for the United States market. Some of this supply might be needed in the event of a crop failure here. In the meantime, there is too much tung oil in the Western Hemisphere in terms of United States prices and consumption. The developments of substitutes has progressed to a point where the demand for tung oil now depends primarily on its price relationship to technologically acceptable substitutes.

Substitutes: The most work that is being done is to find new uses for the oil so as to increase its consumption. In former years, 85 percent of all tung oil was used in the protective coating industries. In recent years, the development of new material such as resins and latexes has made possible new protective coating formulas that replaced those formerly using tung and other oils. This new development has resulted in substantial reductions in the requirement for not only tung oil but other vegetable and animal drying oils.

### NATURAL RUBBER

1. Can material be produced in the United States?

There is no production of natural rubber in the United States. During World War II, some 32,000 acres of guayule were planted in California, Arizona, New Mexico, and Texas. Over 1,200 tons of rubber were produced, partly from wild shrub from Texas. The unharvested shrub on 23,552 acres of land was plowed up after the end of the war. Other shrub was disposed of later and there is now less than 100 acres of experimental plantings. Research since the war has resulted in the development of hybrid types of guayule with greatly increased yield and disease resistance and the perfection of processes by which a rubber fully equal to any other natural rubber can be extracted from guayule. Profitable production of rubber from cultivated guayule has not been demonstrated in the United States. The margin between profit and loss is narrow. Continued improvement in yield might reduce costs. Increased cost of the competing products, imported natural rubber and domestically produced synthetics, might alter the financial relationship.

2. Can material be produced in the Western Hemisphere?

Hevea rubber is native to South America and can be grown anywhere in the American tropics where there is suitable soil. In general, it is limited to altitudes less than 2,000 feet and areas with a well-distributed rainfall of over 70 inches per year. There are other rubber plants that are native to the American tropics but practically all of our rubber now comes from Hevea, mostly from cultivated trees in the East.

3. Does the United States have the ability to become self-sufficient in production?

A total of 1,335,373 tons of rubber was used in the United States in 1953. Of this amount, 42 percent was the natural product. At present, about 44 percent of all rubber being consumed in the United States is natural. Variations in price will cause variations in the relative usage of synthetic and natural rubber. Assuming a total consumption of 1,200,000 tons and a 60–40 relationship of synthetic and natural rubber, there will be an annual need for around 480,000 tons of natural rubber. Restrictions of usage in an emergency to a minimum would still require an annual supply of at least 200,000 tons of natural rubber.

For several years of any national emergency, the existing strategic stockpile would supply the minimum needs for rubber. In a prolonged emergency, new sources of natural rubber would have to be in sight to justify continued withdrawal as the stockpile approaches critical shortage.

Substantial quantities of guayule rubber can be produced in the United States. The cost of production would be well above the present price of 20.5 cents per pound for imported natural rubber. Yield improvement through continued research could reduce the cost. Guayule rubber would meet sales resistance on the part of rubber manufacturers because of its past reputation of poor quality. It can now be produced in a quality equal to that of imported natural rubber.

There is no factory in the United States for extracting the rubber from guayule shrub. Hence, there would be no sale for the shrub even if a farmer wished to assume the risk that the final price would be below the cost of production. A minimum-sized factory to turn out first-quality rubber would cost around $1 million. This factory would be capable of handling the shrub from 5,000 acres of land each year. On a 5-year rotation, that would require a total area of 25,000 acres of shrub, or 30,000 if each area were held fallow for a year before replanting. Capital expenditures on the factory and shrub would amount to around $4 million before the first harvest which would be at the end of the sixth year, since 1 year would be needed for growing nursery stock and 5 years in the field for shrub production. Such a unit would produce about 2,000 tons of rubber per year and this yield might be doubled if new strains now being tested maintain their present promise. At present yields, 10 such units would require a total of 300,000 acres and would produce 20,000 tons, or about one-tenth of our minimum strategic needs of rubber annually. Such an acreage of land entirely suitable for guayule production would be selected in areas of the Southwest where the production of food and fiber crops is hazardous and uncertain. It is doubtful that private capital could be induced to invest in such production unless guaranteed a minimum income. The immediate need is for continued research to develop outstandingly high-yielding strains and gradually to replace the present seed stockpile with seed of high-yielding disease-resistant strains selected particularly for low-cost dryland areas.

4. Can the Western Hemisphere become self-sufficient in production?

Under category 3, the normal needs of the United States for natural rubber are estimated at about 480,000 tons and the minimum strategic needs at 200,000 tons. These amounts are chosen for the purposes of this discussion, rather than as official estimates of need, since such estimates are not in the province of this Department.

An additional annual amount of 100,000 tons of rubber may be estimated as needed by Latin American countries. If these countries would accept 40,000 tons of synthetic rubber in an emergency, it could be assumed that an absolute minimum of 260,000 tons of natural rubber would be needed in the Western Hemisphere.

Total production of rubber in the Western Hemisphere was estimated as 36,475 tons in 1952. This was largely from wild trees in Brazil, Peru, and Colombia. There are now approximately 48,000 acres of planted rubber trees in the American tropics. When this rubber comes into bearing it should produce 20,000 tons of rubber annually. Assuming a continued annual production of 20,000 tons of wild rubber, but that in an emergency this can be increased to 30,000 tons, it can be estimated that there is now a production potential of 50,000 tons annually. To reach the minimum need for an annual production of 260,000 tons of rubber would require an increase in annual production in the Western Hemisphere of 210,000 tons.

If a potential production of guayule rubber in the United States of 20,000 tons annually were developed, there would be a need for an expansion of production capacity in Latin America by an additional 190,000 tons. To supply this tonnage of rubber would require the planting of an additional 500,000 acres of rubber trees.

That amount of undeveloped land could easily be found in areas of Latin America where soil, climate, accessibility to transportation, and all physical conditions are entirely favorable for rubber production. Serious questions have been raised as to the labor supply in Latin America for an undertaking of this size. Large plantation operations requiring 1 resident laborer for each 4 acres of planted rubber probably would find the concentration of 125,000 laborers in groups to take care of large plantations a difficult operation. There are many time this number of small farmers, however, who could add rubber growing to their present farming operations without greatly affecting the local supplies of labor or requiring greater concentration of labor than already exist.

The success of the first plantings made in cooperation with the present program of the Department of Agriculture has provided an incentive for local planting. The needs of the rubber industry in the larger countries has provided ready market for the rubber at prices well above world prices, so the prospective growers

are not discouraged by the present low world prices. The few commercial producers in Latin America are producing at costs no higher than for similar production in the East.

The most serious immediate need of the rubber program in the Western Hemisphere is for a continuation of research. The present project of the United States Department of Agriculture in Latin America is entirely supported by FOA funds. The total expenditure is less than $600,000 annually—$307,253 of this sum is allotted to the Department of Agriculture and additional amounts are spent for supporting services by the Foreign Operations Administration.

The needs of the program are not for increase in total allotment of $600,000 but an assurance of continued research effort.

The development of new strains of rubber trees that can be planted as seedlings and that will combine high yield and disease resistance is well on the way to accomplishment. At present it appears that the goal can be reached within 10 years.

The present interest in rubber planting in Latin America would indicate that if there is no serious set back due to failure of plantings or other discouragement, the Latin American countries can be self-sufficient within 10 years and can produce sufficient rubber to meet also the minimum strategic needs of the United States within 20 years.

5. Substitutes: American and foreign companies had developed synthetic rubbers prior to World War II, but production was minor and uses were confined to special purposes. During the war there was tremendous expansion of synthetic rubber production facilities. This development was financed wholly by the Federal Government which still owns and operates the facilities. Congress has authorized the disposal of the synthetic rubber plants to private industry but no actual sales have been made.

It is our understanding that there are now synthetic rubbers that are superior to natural rubber for many special uses. Our specialists have been informed that in certain respects it has been impossible to synthesize a general purpose rubber equal to natural rubber. Synthetic rubbers, in flexing and retracting, build up high internal heat. Small tires can be made of synthetic rubbers in spite of this heat build-up, but large truck and airplane tires require natural rubber to avoid early failure.

Government financed research is being conducted by rubber companies, the Government rubber laboratory in Akron, Ohio, and several universities to develop new processes of rubber synthesis. The Quartermaster Corps of the Army is financing research by this department to determine how natural rubber is formed in plants. Through this research it is hoped that new leads may be obtained on how a rubber with the same structural composition as natural rubber can be synthesized.

### COTTON, EXTRA LONG STAPLE

Uses: Egyptian Karnak or equivalent is required for high-speed sewing thread and fabrics which are to be coated such as balloon and airplane cloth. It is also used as fine wire insulation and for making sleeping bag and parachute harness fabrics, Byrd cloth for Arctic clothing and "typewriter ribbon" tape.

1. Can it be produced in the United States?

This type of cotton can be produced both in the United States and in other Western Hemisphere countries to a limited extent. In the United States, extra long staple cotton has been produced for many decades and prior to the early 1920's when the boll weevil spread to the Southeastern States, there was a sizable Sea Island cotton industry in that region. American-Egyptian cotton production in Arizona and neighboring Southwestern States was initiated more than 40 years ago. Production has varied greatly, however, from year to year ranging from nearly 30,000 bales in the late 1920's, less than 10,000 bales in 1932 and 1933, to 70,000 bales in 1942. Production from 1945–49 was less than 5,000 bales annually.

While adequate land is available in the United States for production of extra long staple cotton, the yield is not as high and the unit cost of production is much greater than for upland cotton.

2. Can it be produced in the Western Hemisphere?

Over a long period of time the major quantity of extra long staple cotton (about 98 percent) imports into this country have been imported principally from Egypt with a smaller quantity of American-Egyptian type from Peru. Imports from Egypt (mainly of extra long staples) during the 8 postwar years averaged 82 percent of the total and those from Peru, 16 percent (including some medium

long staple). About 4,000 bales annually of extra long staple cotton (nearly all Sea Island variety) are produced in the British West Indies of which virtually all is exported to the United Kingdom with a few hundred bales being frequently exported to the United States.

3. Could the United States become self-sufficient in production?

Since extra long staple cotton has a number of strategic and military uses for which upland cotton and other fibers cannot be substituted satisfactorily and domestic supplies historically have constituted only a small portion of requirements, programs were developed to increase domestic production of specialized varieties of American-Egyption cotton in 1951 and 1952. In line with this objective, and at the request of the Munitions Board, the Department of Agriculture established production goals of 75,000 bales of American-Egyptian cotton in 1951 and again in 1952. Special price guarantee programs to provide incentive for increased production were in effect during both of these years. Production totaled 46,000 bales in 1951 and 93,500 bales in 1952. No special production program was in effect in 1953. However, commencing with the 1953 crop the price of extra long staple cotton is being supported (currently at 74.52 cents per pound) pursuant to Public Law 585, 82d Congress. The 1953 production is estimated at 64,400 bales. The 1954 support price of extra long staple cotton is mandatory at 90 percent of its parity price. Marketing quotas and acreage allotments are in effect for the 1954 crop. Due to acreage restrictions provided by the AAA Act of 1938, as amended, when supplies reached a certain level. the 1954 crop is subject to quotas and therefore the production is not expected to exceed 30,000 bales, the minimum provided by law.

At the request of the Munitions Board and with defense funds, programs for the purchase of high quality planting seed of the American-Egyptian varieties were in effect in 1950 and 1951 so as to assure a supply adequate for producing the desired quantity of extra long staple cotton in the event of an emergency. Although no seed-purchase program was developed for the 1952 or 1953 crops, as of January 1, 1954, there were about 930 tons still in inventory, which would plant approximately 60,000 acres yielding about a half a bale per acre. Rotation of this stock within a period of 5 years would be advisable if the viability of the seed is to be preserved.

Notable progress has been made in the breeding and improvement research program designed to produce dependable yielding extra long staple cottons possessing fiber quality satisfactory for the requirements of the fine goods spinners. It is expected that about 50 percent of the 1954 acreage will be planted to Pima S–1, a new variety of American-Egyptian cotton. In a wide series of tests last year, it averaged about 10 percent higher yields than Pima 32, the standard variety now being grown. This higher yield should enable American-Egyptian cotton to compete more successfully with Uplands in the Southwest. In a number of mill tests, the new variety has performed satisfactorily. From an agronomic standpoint, the new variety is different from older types in its compact plant habit and the higher lint percentage.

The facilities of the United States Branch Cotton Ginning Laboratory, Mesilla Park, N. Mex., have been expanded with a building annex and new roller ginning equipment to investigate successful processing of the extra long staple cotton harvested by spindle pickers. Improved varieties, machine harvesting, and successful processing hold the key to stabilizing the economy of extra long staple cotton production.

4. Could the Western Hemisphere become self-sufficient in production?

It is probable that during an emergency sufficient extra long staple cotton could be produced in the United States and other Western Hemisphere countries to meet essential needs. The price differential between extra long staple and Upland cotton would have to be greater to encourage production which conceivably might require Government price incentives and other Government aid. In this connection, it is of interest that the current support price of extra long staple cotton is nearly 2½ times the support price for Upland cotton. However, it would probably take at least 2 years to build up United States production to meet emergency requirements.

Substitutes: Some substitution can be made by using the longer staple varieties of Upland cotton for some end uses. American-Egyptian varieties of extra long staple cotton consisting largely of the Pima strains can be satisfactorily used in the manufacture of the same types and qualities of products in which imported Egyptian and Peruvian extra long staple cotton is used. In fact, some of the domestically produced varieties of extra long staple cotton have certain spinning qualities that are superior to the imported Egyptian Karnak and

Peruvian Pima. This is particularly true with respect to the yarn strength factor. In addition, the spinning industry is constantly conducting research into substitute materials, such as the manmade fibers, also substitute uses both for military and civilian requirements.

COTTON, UPLAND (SHORT STAPLE)

Upland cotton is grown throughout the southeast and southwest areas of the United States from the Atlantic to the Pacific coast. Given proper application of manpower, land, and insecticides, the United States could be entirely self-sufficient in production of raw cotton during an emergency. Shortages of cotton civilian end products which occurred during World War II probably are attributable to a large extent to diversion of manufacturing facilities to war production and manpower to the armed services and defense production rather than to any shortage of raw cotton.

SILK

Uses: The principal uses of silk are wearing apparel, surgery, parachutes and powder bags.

The united States has not been able to produce silk on an economical basis to meet the competition of foreign production. This is true also of other Western Hemisphere countries with the exception of Brazil. A small amount of raw silk was produced in Brazil in 1945–46, of which small quantities were exported to the United States.

Substitutes: Manmade fibers such as nylon, rayon, acetate, have largely replaced silk for wearing apparel. Nylon has replaced silk in parachutes, partially acetylated. Cotton is being used for powder bags and other material in surgery, but cannot be used in all types and instances.

The Bureau of Agricultural and Industrial Chemistry's Southern Regional Research Laboratory at New Orleans is continuing work on partially acetylated cottons as a possible substitute for silk in cartridge cloth. Ordnance tests have shown this chemically modified cotton to perform satisfactorily as a silk substitute for cartridge cloth. Through close cooperation with Army Ordnance, Navy Bureau of Ordnance and a large textile finishing firm, commercial quantities of acetylated cotton fabric are being prepared for large-scale firing trials.

WOOL

1. Can material be produced in the United States?

The annual average United States production of wool, including pulled wool, during the past 5 years of approximately 122 million pounds, scoured basis, is only about one-third of the annual average requirements of approximately 371 million pounds, scoured basis, during the past 5 years. The United States depends upon foreign sources for the balance of its requirements. In the event of actual war, requirements, and hence dependence upon foreign sources, would undoubtedly increase.

2. Be produced by other countries in the Western Hemisphere?

Argentina and Uruguay, in the Western Hemisphere, furnish approximately one-third of United States requirements of apparel wool. The balance of this country's requirements, secured from abroad, is furnished largely by Australia, Union of South Africa, and New Zealand.

In case of war, the Western Hemisphere countries might increase their exports somewhat to the United States, but the quality of the wool purchased in these countries places a limit upon the extent to which the United States could depend upon these nations for its increased requirements. A large portion of the Fine Merino wool required by the United States to supplement domestic production is obtained from Australia and the Union of South Africa, since such wool is not produced in Western Hemisphere countries in sufficient quantities to satisfy United States requirements under either peace or war conditions. However, even under war conditions, it is likely that some wool would continue to be imported from Australia.

On December 31, 1953, the CCC had approximately 45 million pounds, scoured basis, of wool acquired under price support programs. However, this amount would not be sufficient to supply domestic mill requirements for two months at the average weekly rate of consumption in 1953.

3. Does the United States have ability to become self-sufficient in production?

It is estimated that the feed and forage resources of the United States that can be best utilized by sheep will permit an increase of approximately one-third

in our domestic production of wool. Such an increase would require an incentive price to cover costs in sheep production and to improve the competitive position of sheep and wool production in relation to the production of other kinds of livestock. Other stimulating factors would be: more efficiency in production through research, and the adoption of improved farm and ranch management practices including conservation programs to increase the carrying capacity of grazing lands and the administration of public lands to assure their full utilization within their sustained carrying capacity and stability of operations on the ranches using them. An increase of one-third in the production of wool would still leave the United States far from being self-sufficient in wool considering our steady increase in population. United States self-sufficiency in wool could likely be attained only at a prohibitive cost.

4. Do other nations of the Western Hemisphere have the ability to become self-sufficient in production?

Increasing production of wool in other Western Hemisphere countries sufficiently to make up the deficiency of United States production would encounter problems similar to those of increasing production in this country. In Uruguay, recent production has been at record levels and has resulted in overgrazing. In Argentina, wool production is below the prewar peak and the sheep industry has encountered competition from cattle raising. A shortage of meat in Argentina will continue to bring pressure for an increase in cattle numbers.

5. Substitutes: Considerable research has been and is being conducted in the man-made fiber field, and the use of such fiber in the manufacture of items for which wool traditionally has been considered the most desirable fiber has been increasing. The capacity to produce such fibers in the United States has increased rapidly in the past few years and further increases are planned for 1954.

The military services are at present experimenting with blends of wool and other fibers, particularly the man-made fibers, for some military items. Such fibers can and will be used in the future for the manufacture of military items; however, the extent is conjectural. Manufacturers of both old and the newly developed man-made fibers are continually striving to improve their product. As such fibers are improved in quality their competition with wool in both military and civilian apparel items is likely to increase.

### HOG BRISTLES

Uses: Paint, varnish, and industrial brushes.

1. Can the commercial type be produced in the United States?

The bristles from hogs raised in the United States are not suitable for paint brushes. Approximately 5 million pounds of such bristles were imported in 1949; 7 million in 1950; and 5 million in 1952. The chief source of these bristles is China.

2. Does the United States have the ability to become self-sufficient in hog-bristle production.

The method of hog production in the United States, the customary age at slaughtering, and the type of hogs produced here prevent the United States from growing hog bristles having the characteristics necessary for paint-brush production. If hog bristles cannot be imported from Asia, it will be necessary to find substitutes for use in the manufacture of paint brushes.

3. Do other countries in the Western Hemisphere have the ability to produce hog bristles of the desired kind?

Since this is the only important hog-producing country in the Western Hemisphere, this solution of the problem would not be practicable.

4. Substitutes: Production of a bristle fiber suitable for paint brushes from the regenerated keratin of chicken feathers has been worked out on a laboratory scale. Commercial production of the new fiber is scheduled to begin about June 1954. The keratin bristle can be cut to any desired length to meet brush specifications. About 100 million pounds waste feathers are produced annually at large processing plants.

Casein has been used for production of bristles, but commercial production of this bristle has been discontinued.

Tapered nylon bristles ranging from 3 to 4½ inches in length and level-end nylon filament are used as substitutes to a fair degree. Horsehair is used but primarily as an extender, and Neoceta. However, synthetic bristles cannot be used in all instances for they are harmed by some paint solvents.

### FEATHERS AND DOWN, WATERFOWL

Uses: For stuffing Army and Marine field sleeping bags (40 percent down and 60 percent small feathers); Air Force emergency kit sleeping bags; insulated casualty evacuation bags; medical hospital pillows (10 percent down and 90 percent feathers).

China, Hong Kong, and adjacent islands account for about 70 percent of the total world output; the United States 10 to 15 percent and Europe 15 percent. Some waterfowl feathers and down are obtained from Canada and Argentina but the output is insignificant. Normal production in the United States amounts to about 1 million pounds per year processed weight. However, in the case of an emergency our requirements could be expected to increase considerably.

During World War II the supply of waterfowl feathers and down was very short and the Quartermaster Corps resorted to limited distribution the use of reprocessed feathers and the use of chicken feathers as an extender. Through continued research on this prob'em it has been found that an extender probably can be used up to about 20 percent without significant loss in insulating quality.

Curled chicken feathers give promise of becoming a fair substitute material and it may be possible in the future through the development of newer processes to effect greater chicken feather substitution.

While no suitable substitute for waterfowl feathers and down has as yet been developed for military sleeping bags, for casualty evacuation bags, experiments indicate at least a partial use of synthetic fiber of the acrylic type. For all other uses—wool fleece, kapok, milkweed floss, chicken and turkey feathers are all poor substitutes in varying degrees.

### BLACK PEPPER

1. Can it be produced in the United States?

Present commercial production of black pepper is in southern India, the East Indies, Malaya, and Siam. It is a strictly tropical vine which will grow nowhere in the United States.

2. Produced anywhere in the Western Hemisphere?

A small amount of experimental work has been done by the Department of Agriculture in investigating the possibilities of growing black pepper in Puerto Rico and other tropical countries of the Western Hemisphere. Indications are that the plant will grow well under conditions as found in Puerto Rico and Central America. No commercial plantations are at present established anywhere in the Western Hemisphere.

If the price of black pepper remains as high as at present, this crop could be established at a profit in Puerto Rico. Business firms concerned with the import of black pepper believe that the price will remain high for some time in the future and are interested enough to invest funds in experimental plantings at the present time. We believe that the New World could become self-sufficient for supplies of black pepper, provided incentives could be given for the preliminary establishment on suitable land. An active program is now under way to bring from the Orient the best-yielding types for trial in Puerto Rico.

Substitutes: There is no real substitute for black pepper as a spice.

### TOBACCO

The United States is a surplus producer and the world's largest exporter of tobacco. We export approximately 25 percent of our total tobacco production or about 500 million pounds annually. However, for blending purposes in cigarettes, substantial quantities of oriental tobacco are imported from Greece and Turkey. Some special-purpose cigar tobacco, also, is imported from Cuba, and a very small amount from Indonesia. These imports total around 100 million pounds, or about one-fifth as much as we export. The unavailability of any of these imported types of tobacco would represent some inconvenience but not a shortage. Tobacco manufacturers normally carry from 12 to 24 months' supply for ageing purposes.

In connection with a possible shortage during an emergency, it is noted that the shortage of cigarettes during World War II was attributable to the sharp increase in consumption both in the United States and allied countries, plus the lack of necessary manufacturing equipment. The impact of war production on supplies of industrial materials and labor precluded increased manufacture of tobacco-processing machinery. At no time during World War II did United States suppiles of tobacco approach exhaustion.

WHEAT

The Western Hemisphere constitutes one of the world's most important surplus-producing wheat regions. Canada, the United States, and Argentina have supplied, on the average, approximately 83 percent of the 915 million bushels of wheat (including wheat flour) moving annually in world trade since World War II. The supply of wheat in the United States and Canada at the beginning of the current marketing season was of record or near-record proportions. The wheat supply position in Argentina, while below previous records in that country, was also abundant. A summary of the current position is shown in the following table:

*Wheat: Western Hemisphere supply position, 1953–54 year*

[In millions of bushels]

| Country | Carryover | New crop [1] | Total supply | Domestic consumption | Available for export and carryover |
|---|---|---|---|---|---|
| Canada | 363 | 614 | 977 | 160 | 817 |
| United States | 562 | 1,169 | 1,731 | 700 | 1,031 |
| Argentina | 73 | 225 | 298 | 125 | 173 |

[1] Marketing year begins Aug. 1 for Canada, July 1 for the United States, and Dec. 1 for Argentina.

NOTE.—Imports of wheat and flour by the Western Hemisphere have averaged about 115 million bushels annually since World War II. Important importing countries in the region include Brazil, Mexico, Cuba, Peru, Venezuela, and Chile. Practically all of these import requirements for wheat are supplied by hemisphere exporters.

Senator MALONE. Now, I am glad that you are all here because you have had experience, you are experts in your own field, and we are leaning heavily upon you. We are glad to have your opinions, Mr. Morse, regardless of any disagreement there might be. We even have disagreements on the Senate floor, as you probably are already very much aware of.

Some of us believe that the pattern of this whole thing, starting in 1934, was to make us dependent on foreign nations for the things you cannot fight without. That is something to think about.

Mr. MORSE. That certainly is not my view, as my judgment is very much in the opposite direction.

Senator MALONE. How long have you been in the Department?

Mr. MORSE. I came in January 1953, with the new administration.

Senator MALONE. I tell you, this has resulted in making us dependent for many things on foreign nations, over many oceans, for things we need to fight with.

Mr. MORSE. I have spent my life in agriculture, and have operated in and studied western agriculture and the sheep industry. I have been a great advocate of the sheep industry through the years.

Mr. ALDERMAN. Mr. Morse, I would like to take some of these items in their regular order as we received them from the Department of Agriculture.

I should like to develop, particularly with a view of which of those we can obtain entirely in the United States, which of those we have to have supplemented by production in the Western Hemisphere, and which of those can be taken care of by substitutes or replacements and which, of course, we are deficient in, no matter what we can do, in the Western Hemisphere, or with substitutes.

Mr. MORSE. I think the replies can best be given by members of the staff.

AGAR—REQUIREMENTS AND SOURCES OF PRODUCTION

Mr. ALDERMAN. Let us take agar. Who will be able to answer that?

Dr. QUISENBERRY. I believe that the statements regarding agar are pretty well outlined in the material that is presented to you there. Under the question of "Can this material be produced in the United States?" it states that it is obtained from a cerain type of seaweed.

Mr. ALDERMAN. Its principal use is in the bacteriological culture medium; is that correct?

Dr. QUISENBERRY. That is correct, and most of the material for the bacteriological grade, presently manufactured in the United States, is from raw materials that we get in Mexico.

Mr. ADLERMAN. Is it being manufactured in the United States at the present time?

Dr. QUISENBERRY. That is my understanding, yes. It is listed as number four on that page. You will notice it says, the American Agar & Chemical Co. is the sole producer.

Mr. ADLERMAN. Do you know what our annual requirements are?

Dr. QUISENBERRY. Yes. For the 5-year period from 1946 to 1952, the United States consumption and exports, both civilian and military, for all uses, averaged slightly under 85,000 pounds annually.

Mr. ADLERMAN. Do you know what our domestic production is?

Dr. QUISENBERRY. Do we have the domestic production?

Mr. RAWLINGS. We do not have the domestic production. The raw material we get from Mexico is processed in the United States. There has been some exploration or rather it has been reported that the particular type of seaweed from which this material is taken does exist on the Pacific coast, but there is nothing definite on the extent of the revenues of the most suitable types at this time.

Mr. ADLERMAN. I think under paragraph 4, you call attention to the fact that the American Agar & Chemical Co., the sole producer of bacteriological grade of agar, was able to import the seaweed from Chile, but a few years ago, Chile shut off imports on the ground that the agar was needed in the South American markets.

Mr. RAWLINGS. That is right, but in the first part of our report it is stated that most of the raw material presently manufactured in the United States is from the raw material harvested in Mexico.

Mr. ADLERMAN. Are there any substitutes for that product?

Mr. RAWLINGS. No entirely satisfactory substitute.

Mr. ADLERMAN. In other words, we are actually dependent, then, for this product from abroad; is that correct? Japan, or China, and so forth?

Mr. RAWLINGS. That is right, at the present time, but not necessarily dependent on Japan and China.

Mr. ADLERMAN. Was there any indication how much was available down in Chile before they shut us off from the supply?

Mr. RAWLINGS. No, sir, I am afraid I have no production figures from Chile.

Mr. ADLERMAN. Do you know why Chile shut off the exports to the United States?

Dr. QUISENBERRY. Just the statement was made here that there was need for it in the South American markets. I do not believe we have any other reason on that.

Mr. ADLERMAN. Do you have any idea whether under wartime conditions we could get that seaweed from Chile?

Mr. MORSE. It will probably come out of Mexico.

Mr. ADLERMAN. Is there any way of ascertaining whether or not we can obtain this material in time of war other than from Japan or across the ocean?

Dr. QUISENBERRY. It seems to me it would be a matter of searching for this type of seaweed, this marine algae, and finding out for sure whether or not we do or do not have a source of it within our own shores. Then the question will come as to whether or not it can be manufactured into agar.

Mr. ADLERMAN. In your opinion, do you think we can become self-sufficient from South America?

Dr. QUISENBERRY. I do not know that I have an opinion as to becoming self-sufficient on that.

Mr. RAWLINGS. The official stockpile list put out by the Office of Defense Mobilization lists that in group 2.

Mr. ADLERMAN. That includes the surplus transferred to the stockpile?

Mr. RAWLINGS. Yes, sir; but also a number of those items are in the stockpile now, including agar, and they have all that the stockpile authorities feel they need on a current basis, but they are subject to continuing review by ODM, which makes the decisions, as to their quantitative adequacy.

Mr. ADLERMAN. In the absence of any knowledge, then, I think we have to assume that we have to be dependent upon all the algaes for this type of commodity?

Mr. MORSE. There is the nearby source in Mexico.

Mr. ADLERMAN. We have no idea how much we can get from that?

Mr. RAWLINGS. I am not sure whether all of it came from Mexico, but in 1952 the United States produced 112,413 pounds, and it is my understanding most of it came from Mexico.

Mr. ADLERMAN. What is that figure?

Mr. RAWLING. It is 112,413 pounds that the United States produced.

Mr. ADLERMAN. What year was that?

Mr. RAWLINGS. 1952.

Mr. ADLERMAN. Our average consumption amounts to 85,000 pounds. Is that correct?

Mr. RAWLINGS. Yes, sir, based on a 5-year average, 1948 to 1952.

Mr. ADLERMAN. Is there any indication in those figures that you have there where that algae came from, whether that was Mexican or Chilean or Japanese?

Mr. RAWLINGS. I feel sure it was mostly Mexican.

Mr. ADLERMAN. I am just wondering whether or not you could supply us with a little more definite information on this subject, with a view of ascertaining whether or not we will have to be dependent upon Japan or whether we can obtain it in the Western Hemisphere. Could you supply that information for us?

Mr. RAWLINGS. Very well.

(See p. 480.)

EMETINE—USES, REQUIREMENTS, AND SOURCES OF PRODUCTION

Mr. ADLERMAN. The second topic is emetine.

Mr. RAWLINGS. Emetine is principally used in the treatment of amoebic dysentery, and also in types of cases where you have liver complications.

I might say that the stockpile inventory at the present time is in a very good position. I do not feel like saying more than that, because the exact quantity is classified.

Mr. ADLERMAN. We realize that all of these items are stockpile items, but what we are trying to ascertain is whether or not we can obtain them without resorting to the stockpile in time of war.

Mr. RAWLINGS. I think we can say that there is no commercial growing of this particular type of root from which the emetine is extracted. It grows wild in the forest floors of the various tropical regions in the Western Hemisphere.

Mr. ADLERMAN. What is the principal producing country at the present time?

Mr. RAWLINGS. Brazil would be the principal producer. We have said in our report that there is no possibility of domestic production in the United States.

Mr. ADLERMAN. But you say the normal large producer then is Brazil. Do we get most of ours from Brazil?

Mr. MORSE. On this map, it shows 38 percent from Panama.

Mr. RAWLINGS. According to my figures, in 1951 the Canal Zone produced 1,073 pounds, that is, ipecac root pounds. United States imports in 1951 from Panama was 44,858 pounds of ipecac root.

The United States in 1951 obtained from Brazilian production, which is the largest, 1,093 ounces—that is refined product.

Mr. ADLERMAN. In other words, almost all of it is produced within the South American area, or Central-South American area?

Mr. RAWLINGS. That is right.

Mr. ADLERMAN. So that we can say that supplemented by South American or Western Hemisphere production we can be self-sufficient?

Mr. RAWLINGS. Yes, sir.

HYOSCINE—PRODUCTION REQUIREMENTS AND SOURCES OF SUPPLY

Mr. ADLERMAN. The next item is hyoscine.

Mr. RAWLINGS. Yes.

Mr. ADLERMAN. It is a drug, is it not?

Mr. RAWLINGS. Yes; it is a drug used for controlling motion sickness. Fighter pilots use this to a considerable extent because it has different effects from dramamine, which has a tendency to make you drowsy, which hyoscine does not.

Senator MALONE. As just a general statement, what do you have to say about hyoscine production?

Mr. RAWLINGS. At the present time, the species that currently is used and has a general promise is produced in Australia, although there is some possibility that research might discover that this country could grow this material to some extent and particularly if the price situation warranted it.

Senator MALONE. Price is not a controlling factor in the matter of national-defense material, is it?

Mr. RAWLINGS. You are right, sir.

Senator MALONE. Therefore, if it is something that can not be transported across a major ocean and you wanted to become self-sufficient in time of war to be safe, what would be the cost involved?

Mr. RAWLINGS. I cannot give you a firm answer on that, Senator. I think it is entirely possible that the development of some of these strains could be effected in the United States, and if price was not a factor during time of war, that we could go at least a part of the way in supplying this. But I certainly could not go so far as to say we could be entirely self-sufficient at the moment.

Senator MALONE. What are the satisfactory substitutes?

Mr. RAWLINGS. According to the information I have from various data that the Munitions Board used to have, it does not have entirely satisfactory substitutes. I just mentioned earlier that dramamine, that people often use when they are taking trips by sea, makes one drowsy, and for combat pilots it is not suitable.

There are also certain types of uses like the treatment of Parkinson's disease, and as I understand from some doctors as an anesthetic compound for women during childbirth, because it has certain characteristics that other anesthesia that is normally used does not have.

Senator MALONE. This is, in general, the information we would like to have on all these materials. For example, with hyoscine, what is the unit customarily used to describe it in weight or amounts, how much of it is consumed, what would be involved in the matter of additional cost in becoming self sufficient in this country, and how long would it take? In general, that is what we want to know in all of these materials.

I think you have done an admirable job in complying with the request that I made by letter for these materials.

Mr. MORSE. It is an extensive job; that is the reason you did not get it earlier.

Senator MALONE. It is a fine job, but it long needed doing.

They did the same thing in the mineral field for us.

Now, I am going to just enumerate the things that I would like to have on all of these materials. The time element is important but not the controlling factor.

Mr. RAWLINGS. On this whole report we have not attempted to give a projected cost of being self-sufficient on any of these programs. I mean in this report I did not realize you wanted that.

Senator MALONE. I understand that. And this is a fine report. I want to compliment you on it again, but this, then, is the information we need for our final report:

First, what type of program must be followed or is being followed to enable the United States to be self-sufficient if supplemented by the production of the Western Hemisphere?

Second, how long a time does it take for such programs to show effective results?

Three, what is the estimated cost for such a program to insure ourselves sufficiency in each item? That is, put it this way, a maximum economic production in this Nation, meaning by that a production that we would arrive at here if we had some production on a long-range principle laid down that would make up the difference between the labor cost and the taxes paid, which are the two principal factors here and in the chief competitive country, and then the entire

hemisphere. It is really the hemispheric self-sufficiency that we are concerned about. The matter of our maximum production on an economic basis would be merely supplementing our economy, but the Western Hemisphere production is the important thing.

So, what type of program must be followed to arrive at self-sufficiency in the Western Hemisphere, and the maximum production in this Nation on an economic basis and how long a time would it take for such a program to show results.

Now, a fourth question is not quite so easy, but it is important. What is the difference in cost, estimated, roughly, of an annual supply produced under these programs in the Western Hemisphere and in this Nation, and the current peacetime American annual cost of such material? In other words, what would roughly be the cost of holding ourselves ready for a self-sufficient production in the Western Hemisphere, in the event of a fourth world war?

That is not so hard as it sounds in the beginning, because you know about what it is costing now and you would have some idea under your program of what it would cost per unit.

Do you understand what I mean by that?

Mr. RAWLINGS. On a per-unit basis?

Senator MALONE. Yes, because you would have to be ready to go into production, become self-sufficient almost immediately until such time, at least, as the judgment of our administration is that the imminence of war has passed.

You see, we have been sold a program here for the last 10 years that war is imminent. We have had this cold war. Mr. Churchill named it the "cold war." Of course, I do not understand a cold war where they are selling everything to the enemy that he needs, but perhaps Mr. Churchill does. As long as we call it a cold war, and we are going to fight a cold war—I know how I would fight them, but I do not understand how we have been doing it—nevertheless, our people are on the uneasy seat.

In other words, you and I might have a difference of opinion how to do these things. The question is, first, though, shall it be done? What is our objective and what are we up against here for the next 5 to 10 years? If it is a hot war which is imminent, then let us get ready for it. Do not let India say that because we are getting 850,000 tons of manganese from her we must sign this further agreement or they will not let us have it. She did say that on monosite sands. So we are subject to a mild form of blackmail. We keep on going, sign an agreement, here, sign an agreement there. If you know you can get all the manganese you need in the Western Hemisphere, it does not mean you would not buy it from India in peacetime on some definite basis which will be laid down by Congress, but it does mean she cannot blackmail you and cannot whip you by withdrawing the supply if you start to fight a war. That means a lot to me. That lets us all out. It does not matter whether we agree on the method or not. Let us get it done.

Now, the only way we can do it in this committee is to have help from men like you who have spent your lives in this business. I have been in the engineering business for 30 years, but I never knew anything about hyoscine and I am not likely to know much about it.

Mr. MORSE. I can share that with you.

Senator MALONE. You see, in our Government we are lucky. In our Bureau of Mines we have a real expert in every field and often more than one have spent their lives in that business. And they are working with us just like your Secretary said you would work with us.

So when we ask you for your opinion, when obviously we are not self-sufficient in the Western Hemipshere on any certain particular item, and if you will go through all the items on these particular questions, what type of program must we follow to become self-sufficient, how long will it take, and what will it cost, and then what will be roughly the difference if we do that, what is the cost of that material, to keep up the availability of these materials, first, with this artificial method of doing it, and then if we just obtain them from the lowest cost area possible, then when somebody says it is so expensive to do this, there is the cost, you can get it. Now, that is what we have in mind.

I directed a survey of the 11 Western States one time, the Philippines, Alaska, and Hawaii. The report weighed about 15 pounds, as much as Webster's Dictionary, and it is still a great reference for it. I just directed it; I did not do all those things. I take no credit beyond what I am doing here, but I think 500 experts worked with us from the chief, Mr. Hoover, down.

So that is what I want this to be when it is presented to the full committee and then to the Senate, a reference work, so that no one can question its authenticity, and its factual material.

Mr. MORSE. We certainly will do that, and when it comes up, if there are any points not adequately covered, give us another chance at it and we will keep working to complete the record.

Senator MALONE. I am going to turn the review of more of the materials here over to Mr. Adlerman to complete this afternoon.

I am going to ask our staff then to confer with you and you can refer them to whoever it is necessary for a brief on the strategic agricultural product picture, because even the brief has to be accurate. I would not, myself, even with my technical training in certain fields, attempt to brief something I did not understand.

Mr. MORSE. Yes, it ought to be briefed by the men who put it together.

Senator MALONE. That is true.

We have already asked you about this map. If you can bring it up to date, it will be helpful. At a glance, it would show anyone where you can get it. You really know, I am sure, you have appeared before enough congressional committees to know that a Senator or Congressman has very little time. In the interest of brevity, if you can just look at something and see where you get it, it is helpful.

I am going to tell you again that I appreciate your appearance here, Mr. Under Secretary, and your technicians that you have with you. I know that you are all busy, and we want to take a minimum of your time, although I think this is one of the most important things that is under way on the Hill today.

Mr. MORSE. That is right. We have the laboratories. We want to step up research. This will help as a guide.

I have had the experience of helping grow the waxey maize corn that we expanded very rapidly during the war to take the place of tapioca, which was shut off very quickly when the Pacific war broke

out. We grew the tapioca starch in corn out in the Corn Belt. Most people think that tapioca is used primarily for food. But, it is very important as a high grade adhesive and for other purposes. It shows what can be done on our farms and in our production here if we get the programs operating.

Senator MALONE. Yes, and when I say the type of program, it may be a pilot plant you need, it may be exploratory work in South America or in Canada, what is the type of investigation and program that must be followed, how long will it take and how much will it cost?

When I quit the engineering business to come back here I thought this job needed doing. That is why I am doing it.

Mr. MORSE. We were also operating one of the laboratories trying intensively to find a source of rubber through synthetic production out of agricultural products.

We did not succeed, but we were working at it very hard during the war.

Senator MALONE. I was interested in hearing you mention guayule. I made a report to the Senate Military Affairs Committee. You were investigating it during World War II. We certainly can make rubber from guayule. It is just a scarce material and, as you say, it takes quite a while to grow, but in California it flourishes in certain places.

Dr. QUISENBERRY. May I say, Mr. Chairman, that we do have a modest program on guayule going on in California.

Senator MALONE. Have you been carrying it on since World War II?

Dr. QUISENBERRY. Off and on. It dropped off for a while. A small program has been going on now. We have developed new strains of guayule that have greatly increased the yield of rubber per acre. We also have some plants that will build up a higher percentage of rubber more quickly under the warm conditions of Texas. We do have a stockpile of seed, you know, that ODM has asked us to maintain for them.

Senator MALONE. Put yourself in the position of the chairman of this committee, if you will, who wants to show up with a factual report that shows just the things we have described and talked about today. It has always been my theory that when people have the same set of facts, regardless of what opinion they hold when they go into it, eventually they will come out with something, and it will work out. It has to work out. We have to make up our minds whether we are in danger of world war III or IV, whatever we are going to call it—I call the Korean war world war III—whatever we call it, if it is an all-out war we have to win it.

And if you did, and I presume you did wrestle with that War Production Board as I did during World War II, you know, for example, they sat there and sweated for a long time because they were sinking 88 or 90 percent of our shipments from South Africa with chromite and manganese, we just could not get them here.

This is what they tell us. In South Africa, where the uranium is located, in the Belgian Congo, manganese, chromite, all those areas, while within hours perhaps, at least within days, they will be neutralized, we cannot get it, our potential enemy cannot get it, but that does

not help our factories any. They will destroy the forts and destroy everything.

So I am going to the Senate floor, and leave Mr. Adlerman to review this material with you.

Mr. ADLERMAN. I would suggest this. The Senator has given you some statements as to what he would like you to follow through on. The questions are contained on a little memorandum I have. You can just disregard the top part.

These are the things he would like to have covered.

Now, it need not be very lengthy, just enough to give us a statement of what it is. Perhaps it can be done in a tabular form, on a spread sheet, not too large, and we can reduce it and put it in the report. We can have all the items listed with the idea of ascertaining which ones we can be self-sufficient in and which ones we cannot.

So far as I can see, it just seems to me that maybe 3 or 4 items are the only ones that we would have a problem about being unable to produce within the Western Hemisphere. Those might be low tonnage items. Perhaps we can find substitutes for them.

Whom do you want to leave in charge now?

Mr. MORSE. I will let these men here take this memorandum and continue to respond to the inquiry. If I could contribute, I would be glad to stay, but if I am not contributing there is another place where I can be useful.

Mr. ADLERMAN. We will go through this rather rapidly now.

Let us take each item as we go along.

The principal things that I think should be covered in each one of these items are: (1) what is our average consumption over a period of years; (2) our average production, if we have any; and (3) if we do not have an axerage production, the percentages of imports from the various countries. If you will notice on this map, if that is brought up to date that will give you the percentages of imports from the various countries on these items.

Just for the sake of brevity, now, taking this entire list by name, let us see if we can come to a quick and easy solution on some of these items.

Agar—can we be self-sufficient in the Western Hemisphere, or with the use of replacements and substitutes? That is one that we have already covered, and it seems to me that is one of those that is rather doubtful and which will require further study.

Mr. RAWLINGS. My reply before in response to the reading of the consumption figure and the amount that the United States processed, I noted in our writeup that most of this raw material was processed by the American Agar & Chemical Co., at least during the postwar, World War II, years was of Mexican origin. So there are 112,000 pounds processed.

Mr. ADLERMAN. Do you feel we can be self-sufficient on that item?

Mr. RAWLINGS. It appears that we can by including the Western Hemisphere.

Mr. ADLERMAN. Now, the next item is emetine. I think we have covered that, but for the sake of continuity, let us take it again. I think that is one that was produced mostly in South America; is that correct?

Mr. RAWLINGS. Central America, correct.

Mr. ADLERMAN. Is that one that you feel along with our substitutions and with the production in South America that we can be self-sufficient in, in the Western Hemisphere?

Mr. RAWLINGS. I think we can depend on that.

Mr. ADLERMAN. The third one was hyoscine, which we have already covered.

Mr. RAWLINGS. The only point on the hyoscine is that there are a few species in which there has been some research and introductory tests in the United States, that at this time I think the Department feels that it will take quite a long time to develop sufficient quantities to provide a commercial source for hyoscine.

SOURCE OF HYASCINE

Mr. ADLERMAN. In your memorandum, it does not show where we get most of it at the present time.

Mr. RAWLINGS. Virtually all of this is from Australia. In fact, I do not know of any other source.

Mr. ADLERMAN. Would you cover that in the program features, that we mentioned before rather thoroughly, so we can see whether or not we can be self-sufficient?

Mr. RAWLINGS. In answer to all these things, I would like to point out it is going to be a rather difficult thing to say whether you think you can take a plant and develop it. For instance, if you use the example of the coconut palm, we have palm trees in Florida, along the gulf coast areas, but so far plant research has never been able to develop a coconut palm which will produce the type of nuts yielding this coconut oil. So it is a conjectural thing.

Mr. ALDERMAN. We can apply the rule of reason to it, too. I mean, it is quite obvious if you are going to require tremendous quantities we may not be able to grow a sufficient amount in Florida. But I think using the rule of reason, you will be able to give an answer on these things.

OPIUM—PRODUCTION, REQUIREMENTS AND IMPORTS

Now, let us take up opium.

Mr. RAWLINGS. Opium has never been produced in the United States other than on a purely experimental basis.

Mr. ADLERMAN. Do we have any program which would enable us to become self-sufficient on opium?

Mr. RAWLINGS. We do have, at the request of the Munitions Board, a quantity of seed which we believe under proper conditions could possibly be expanded into sufficient production to take care of at least a considerable part of our needs. That would depend on pyramiding. I mean we could not get adequate production the first year; it would take several years to start producing in quantity.

Mr. ADLERMAN. In other words, we do have a program working which would strive toward self-sufficiency?

Mr. RAWLINGS. Yes, sir.

Mr. ADLERMAN. And is there any hope of success?

Mr. RAWLINGS. I should like to point out that the Narcotics Act prevents the growing of opium during peacetime and even in war, except under certain guarded conditions.

Mr. ADLERMAN. I can understand that. But if we needed it during wartime, we could grow it and we could be self-sufficient; is that the idea?

Dr. QUISENBERRY. Yes, sir. As stated here, under a license from the Bureau of Narcotics, Treasury Department, the Department of Agriculture is doing some research work on this poppy and trying to find ways and means of getting a higher percentage of morphine out of the plant. As stated, we do have this supply of seed which is in storage and, given a due amount of time, as Mr. Rawlings has said, we can be potentially self-sufficient.

Mr. RAWLINGS. That is correct, and I think in addition to the growing of the seed, the extraction is also a problem that would require further attention.

Mr. ADLERMAN. You mean the labor cost?

Mr. RAWLINGS. Not only that but principally the method of extraction. In other words, all plant sources of opium are not substantially the same, and the strains that we have found we could grow in the United States are probably not all solved as to the recovery or extraction of the opium from the poppies and in turn the morphine content from the opium by the drug manufacturers. So there is some work that remains to be done there, too.

Mr. ADLERMAN. That is being worked on now?

Mr. RAWLINGS. I think the drug companies are, yes, sir.

### PYRETHRUM—USES—PRODUCTION, REQUIREMENTS AND IMPORTS

Mr. ADLERMAN. Let us take the next item, pyrethrum. What is that used for?

Mr. RAWLINGS. Pyrethrum is best known as the material used in mosquito bombs. It is principally an ingredient for the control of disease-bearing insects. There is no commercial production in the United States of pyrethrum and I think there is considerable question whether we could feasibly grow that in the United States. There is a limited amount of work, that is being done in some of the Central American countries and some of the others.

We have also already developed in the Department a new insecticide known as allethrin, which substitutes for a considerable portion of the pyrethrum formerly used, although as I understand from reports rather recently, allethrin could not be used as a substitute for all purposes of pyrethrum in the recent Korean conflict.

For instance, in the killing of the disease-type insects and body lice, certain species of those react differently to the different insecticides. For some allethrin would kill satisfactorily and some required pyrethrum.

Mr. ADLERMAN. Do you feel it can be grown in South America successfully and that South America could give us enough to render us independent of any other countries?

Mr. RAWLINGS. It certainly could be expanded. I would like Mr. Horn to make a few comments to that question.

Mr. HORN. Two United States firms, about 18 months ago, established production in Ecuador and they are expanding their acreage just as fast as they can. That is a bright spot.

Mr. ADLERMAN. Is the outlook bright that we can be self-sufficient?

Mr. HORN. That is the only effort that I know of for expansion in this hemisphere.

Mr. ADLERMAN. Do you have any idea of the quantities of consumption and the quantities of imports that we have at the present time?

Mr. RAWLINGS. The only figure I have is that total United States imports in 1948 were 3,613,000 pounds.

Mr. ADLERMAN. At the present time, I notice that practically none of it is coming from South America.

Mr. HORN. That is true. These companies are new. The reason American companies set up in Ecuador is because of an outbreak of disease in the Belgian Congo. They were uneasy about their supply.

Mr. ADLERMAN. Have you any idea what the figures are of importations or consumption in this country?

Mr. RAWLINGS. I just gave you the imports. The figure I have here is that in 1948, they were 3,613,000 pounds. I seriously doubt that that figure would increase since that date, because of the use of other substitutes such as allethrin already mentioned.

Mr. ADLERMAN. At the present time, I see that we are getting about 8 or 9 percent of our material coming from Africa, Belgian Congo, and British East Africa.

Mr. RAWLINGS. Of course, as I understand, you could grow the flowers in the United States from which the pyrethrum is taken. However, the tremendous amount of hand labor that would be required in growing this crop, and also the type of lands which would be suitable land, would be in competition with other types of crops such as tobacco. I think it would be too optimistic to say that we could become entirely self-sufficient in the foreseeable future.

Mr. ADLERMAN. Do you know whether or not there is any program on now in South America, sponsored by the Government, for the production of this material in South America other than those two commercial projects?

Mr. HORN. That is all I know of.

Mr. ADLERMAN. Have you any authoritative information about whether or ont those companies would be able to produce all that is needed in the United States?

Mr. HORN. I don't believe that is their aim. I think their intention was to get into commercial production in the best environment they could find and they chose Ecuador.

Mr. ADLERMAN. Is it an item that can be stockpiled for long duration?

Mr. RAWLINGS. The pyrethrum, yes, sir.

### QUININE—USES—REQUIREMENTS, PRODUCTION, AND IMPORTS

Mr. ADLERMAN. Now let us take up quinine.

Mr. RAWLINGS. I would like Mr. Horn to take that over, please.

Mr. HORN. During World War II, there was a great effort on the part of our Government to collect quinine-yielding barks from the wilds in South America and on plantations—abandoned plantations in Guatemala.

Mr. ADLERMAN. Where do our normal imports come from?

Mr. HORN. Java.

Mr. ADLERMAN. Was not quinine native to South America?

Mr. HORN. Yes, sir.

Mr. ADLERMAN. As I recall, we had quite a problem trying to get some from South America. Has any production program been developed to increase the production in South America?

Mr. HORN. No, the countries have little interest in it at this time because Java's supply is back in now and new antimalarials have come in that are largely substitutes.

Mr. ADLERMAN. Do you think we can be self-sufficient with the combination of the substitutes and whatever production can be obtained in South America?

Mr. HORN. I do not know if any estimates have been made on it. We have quite thoroughly exhausted that which was in the wilds of South America during World War II. Now whether or not the new antimalarials, if we were in a pinch, would take over completely, or not, I do not know. I do not know of a study in that regard.

Mr. ADLERMAN. In case of war, what would we do if we were not able to get our material from Java?

Mr. HORN. I believe we would have to leave it to the Public Health Service to answer that. As to what extent these new synthetics can be substituted would be the No. 1 question.

Mr. ADLERMAN. Who is the authority on these items? Is it not the Department of Agriculture?

Mr. RAWLINGS. As to the uses, I think possibly the Public Health Service and Food and Drug Administration could make the best reply.

Mr. ADLERMAN. I mean as to the uses and as to the amount that would be stockpiled, and so forth. Who makes those determinations? Who is the principal adviser on these things?

Mr. RAWLINGS. The advice on practically all these items rests on ODM and they just call upon us for certain background information.

Mr. ADLERMAN. You furnish the background information but do you not have to furnish them with the production figures and consumption figures and the ability of these countries to produce, and so forth?

Mr. RAWLINGS. As you probably know, through the old Munitions Board structure, there were a series of interdepartmental commodity committees on which experts would be named from the different departments and on that basis we have always had membership from the department pertaining to certain materials. As to the production or consumption, I think the Department of Commerce has usually furnished those figures, primarily from its Bureau of Census.

Mr. ADLERMAN. In making up the final summary on this thing, may we ask you to give us a pretty clear definition of whether or not—I mean if you can obtain the information from ODM or any other sources—give us a pretty clear indication whether or not there is a feeling that we can be self-sufficient or whether or not you have a going program or whether or not one is going to be instituted to see to it that we have those materials?

Mr. RAWLINGS. I think the general feeling is that we would not be hard pressed at all on quinine in the event of another war or emergency with the small amount we could obtain, if necessary, and the stockpile condition on quinine and the fact that atabrine and some of these others have been demonstrated to be satisfactory substitutes.

Mr. ADLERMAN. The stockpile position may or may not be a satisfactory one, depending on the length of war?

Mr. RAWLINGS. You are certainly right there, and it depends on what you might call not a guess, but the educated estimate of the entire group as to what they consider adequate.

Mr. ADLERMAN. Some of their thinking may be a little erroneous if they counted on getting materials from the present sources of supply; they may not be available.

Mr. RAWLINGS. That is true. As I understand, however, this is one item that I think the general feeling is that they would not have the same urgency or dependency as they do on a number of other items in the list.

Mr. ADLERMAN. And quinidine?

QUINIDINE

Mr. HORN. Quinidine is extracted from the same bark. They get all the alkaloids together and they separate quinidine from quinine. Quinidine is used in the treatment of one peculiar heart trouble, and I believe someone once told me there are only about 5,000 people in the United States that were dependent on quinidine for their existence. So it has a very limited use and as long as we process any quinine-yielding bark our processors can take out sufficient quinidine to meet our needs.

Mr. ADLERMAN. The quantities are rather small?

Mr. HORN. Yes, but if our bark supply, from which we get our quinine, were shut off our quinidine supply would also be shut off.

Mr. ADLERMAN. That is a stockpile item, too?

Mr. HORN. I believe so.

Mr. ADLERMAN. And shellac?

SHELLAC—USES AND SOURCES

Mr. RAWLINGS. As you know, shellac is used as a sealant for primers in shells and cartridges; protective coating for various wood patterns and electrical insulation papers; adhesive for binding mica, abrasive wheels, electronic tubes, and light bulbs. It is a wholly imported commodity coming entirely from Asia. About 85 percent of the world's production comes from India. It is derived from the secretions of insects feeding on the sap of various trees of southern Asia.

It is not produced in the Western Hemisphere, at least to our knowledge, and we could not become self-sufficient, at least we do not think so as of now, unless possibly by substitution——

Mr. ADLERMAN. Then we must rely on substitutions; is that right?

Mr. RAWLINGS. That is right.

Mr. ADLERMAN. Are there any uses of shellac that cannot be furnished by substitution?

Mr. RAWLINGS. I cannot categorically state that. I know there are a number of substitutions for certain purposes.

Mr. ADLERMAN. Substantially all of them can be satisfied by substitutions; is that correct?

Mr. RAWLINGS. I would say substantially all but not entirely, but prospects are encouraging.

CORDAGE FIBERS

Mr. ADLERMAN. Cordage fibers.

Dr. QUISENBERRY. On cordage fibers, there is quite an extensive discussion here. We have abaca, which is grown in Central America,

and some of the other men here can tell you more about the production program that is under contract.

Our service has a research program which has been cooperative with the RFC trying to develop better means of growing abaca and better varieties. The facts of the program are outlined pretty clearly here in the outline.

Another type of fiber is sisal, which is grown in Brazil.

Mr. ADLERMAN. Let us see if we cannot name them all. There is abaca, sisal, henequen, jute, kenaf, sansevieria, hemp, and phormium. Is that right?

Dr. QUISENBERRY. That is right.

Mr. ADLERMAN. Now, are they all used for different types of cordage?

Mr. RAWLINGS. Yes, sir, they are, but some are overlapping in use.

Mr. ADLERMAN. These uses are described in this memorandum?

Mr. RAWLINGS. That is right.

Mr. ADLERMAN. Now, what are the present sources of supply for abaca?

Mr. RAWLINGS. Most of it comes from the Philippines, although the western hemisphere countries, such as Costa Rica, Panama, Honduras, Guatemala, and Ecuador, are producing abaca to some extent.

As Dr. Quisenberry mentioned, technicians in the Department are cooperating with what was the RFC in carrying out their Abaca Production Act of 1950. There are about 20,000 acres of abaca under cultivation in the Western Hemisphere. I think the present surveys in Central America indicate that there are possibly 50,000 acres of land suitable for abaca production.

Of course, during the last war abaca was quite an important item and was rather short, and we had to go to substitutes and using other fibers as blenders or extenders.

Mr. ADLERMAN. You have that development program under the Abaca Act?

Mr. RAWLINGS. We are only cooperating by furnishing technicians. The act placed the responsibility in the RFC to carry that out and some of that is under contract, most of it with the United Fruit Co.

Mr. ADLERMAN. Is there any likelihood we can get sufficient abaca from Central or South America to render us self-sufficient?

Mr. RAWLINGS. At the present time, I do not believe we can say that we could be entirely self-sufficient, in depending on countries in the Western Hemisphere. I do think that considerable progress has been made.

For instance, there is no accurate estimate at the present time of whether there is satisfactory land in Mexico and Ecuador, which are two possible sources. There is the so-called Fog Belt in one of those countries. This requires a certain amount of moisture to grow satisfactorily, and it cannot be grown very well in such tropical areas where you have a rainy season and a long dry spell.

So, at the present time, we certainly could not be self-sufficient, depending entirely on the Western Hemisphere, although I do think you might say when the chips are down, with the stepped up program and use of possible other substitutes and some of the other research that has been done on some of these substitutes, we could probably come close to being self-sufficient.

For instance, along with abaca, I think it might be well to skip over to the item of sansevieria. Sansevieria is a plant, which has been demonstrated, can be grown in some of our Southern States. The research that we have done in cooperation with the Navy indicates promise that this may become a suitable substitute for abaca. Of course, the limitation there would be installing a full sized commercial program and all that goes with it. But the research that has been done to date shows that it is quite promising.

Mr. ADLERMAN. Can that be used as a substitute for abaca? I do not see that you mentioned that as a substitute.

Mr. RAWLINGS. That is right. That is why I picked it up at this point because we have done considerable work with the Navy in trying to develop the strains that can be used as a substitute for abaca.

Mr. ADLERMAN. Do you think there is any likelihood we might be able to be self-sufficient?

Mr. RAWLINGS. I think there is a likelihood if they went ahead with the program and there was enough impetus or funds. But I do not think you could be self-sufficient in the first year or two, or anything like that.

Mr. ADLERMAN. You are going to come up with a further report on each of these items, as I understand it, along the lines of the questions that the Senator asked you to answer a little while ago. I do not know if there is much point in going through each and every one of these items as we have gone through them just now.

It seems to me that most of them you have to get some additional information on.

Mr. RAWLINGS. On these types of questions we will have to get some; yes, sir.

Mr. ADLERMAN. Along with that, it seems to me that we ought to get a little clearer understanding about what the consumption figures are, and where we get them at the present time, our present percentage of imports, the present production, some degree of certainty about what we can expect by way of future production on each of these items.

I would like to ask you one more thing. That might save us an awful lot of time and trouble.

Would you just give us a list of these items, a tabulation, the percentage of our consumption that might be able to be produced in the Western Hemisphere?

Mr. RAWLINGS. The Office of Defense Mobilization has that type of information on practically all those items, but we could go through this route to get them.

Mr. ADLERMAN. Could you get those for us and supply it to us? If we can do that with each item, that will give us a quick picture of what our present situation is by way of self-sufficiency.

Mr. RAWLINGS. I assume that is on a peacetime basis. There are fluctuations between years, so you have to take a sort of norm. There is also the question during wartime.

Mr. ADLERMAN. I think perhaps it might be best if we took it on a wartime basis.

Mr. RAWLINGS. The only problem there, sir, is that I would have no way of saying what the consumption on a wartime basis would be. It would just be a figure that I do not feel the Department is

entirely competent to comment on, because the requirements for the particular commodity during wartime are a matter which these interdepartmental committees have worked out for the Munitions Board, now the ODM. In other words, our Department would be uninformed as to the military planning aspect. I would like to give you what information we can that you would like to have.

Mr. ADLERMAN. Could you obtain those figures from the Office of Defense Mobilization for us on a wartime basis?

Mr. RAWLINGS. I could ask them. I just wonder about going through Agriculture to get ODM figures. That is a hard thing to promise. I do not feel I have the authority to promise such a thing.

Mr. ADLERMAN. Suppose you ask them for it. If you have any difficulty get in touch with me. We will try to help you get them. I would not like to have too many agencies involved in coming to a determination. I would like to place responsibility in one place if I can.

Mr. RAWLINGS. Of course, that responsibility does lie now, at least according to all the information that I have had in working with those people, in the Office of Defense Mobilization right now.

Mr. ADLERMAN. Do they have any responsibility in fostering a program of self-sufficiency?

Mr. RAWLINGS. On programs for items where they think it would be of importance to have or would eventually be stockpile items, they always request the Department to institute such a program, and the Department, in turn, uses that request as a basis for taking the matter up with the Bureau of the Budget and, in turn, the Bureau of the Budget brings it to the Congress.

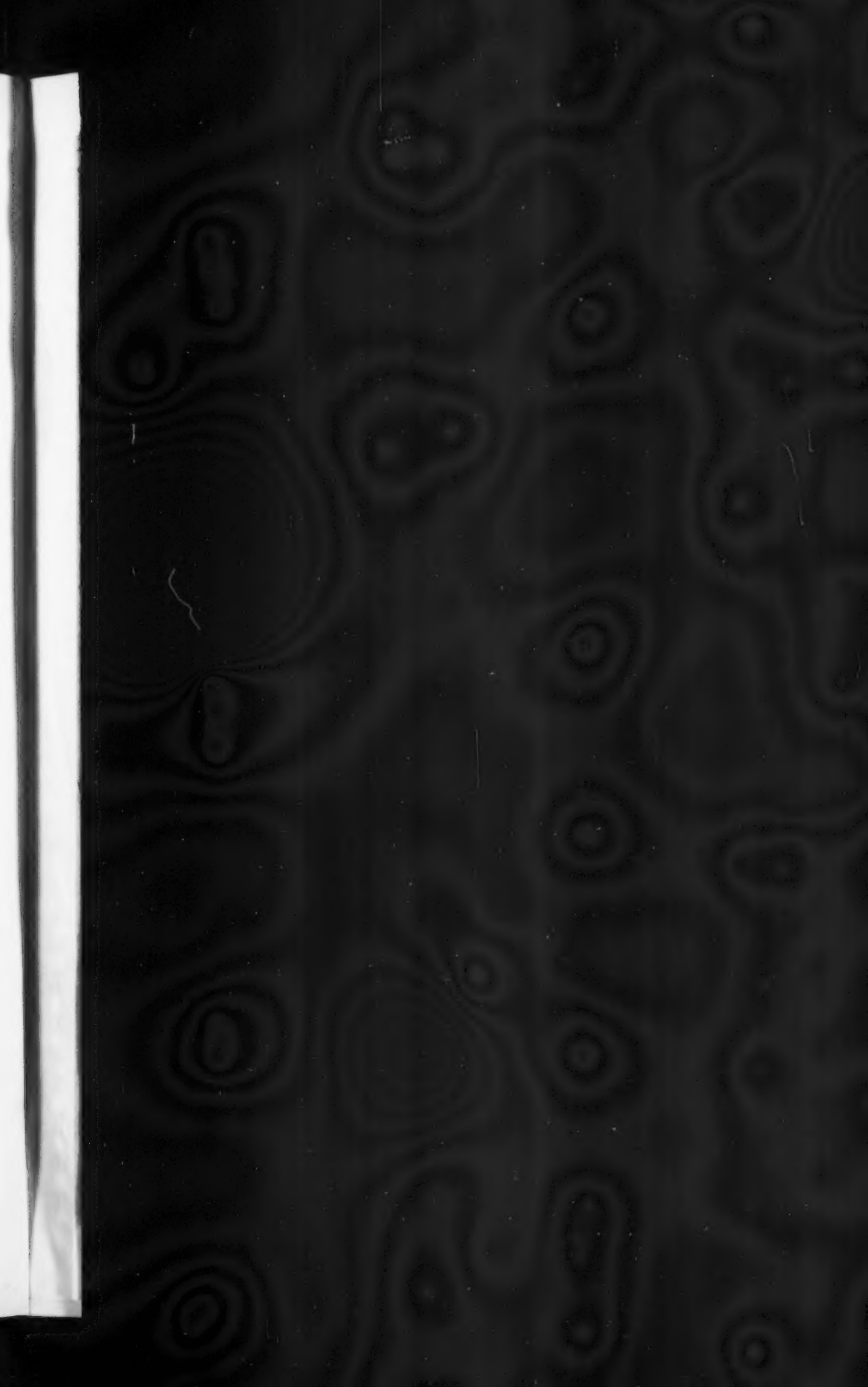
Mr. ADLERMAN. Who handles this in the Office of Defense Mobilization?

Mr. RAWLINGS. Mr. E. T. Weaver is in charge of that phase. He is Assistant Director of ODM for Materials. He would be the one that this type of work comes under.

The point I am making is that we will attempt to get the consumption for you and the production in the Western Hemisphere, and also any figure we can get on substitution. There, again, is the question of how much substitution they consider feasible, and bear in mind that their considerations are not just based on ODM alone but on a committee structure of competent representatives from all parts of the Government and industry in order to obtain the best information on the subject.

The other part, the deficiency, during a wartime year, relates in effect to what our stockpile should be, which is classified, secret. That is the thing which worries me.

Mr. ADLERMAN. I tell you what we will do, Mr. Rawlings. I will get in touch with Mr. Weaver tomorrow. I will ask him to work with you so that we can come up with something, because our time is running out and we have to get our report out, we have to get this thing printed up. We cannot take too much time to delve into any more of these items. I would like to get it as fast as possible. We have only a few more weeks to go. We have to have everything printed up in the next 2 weeks. I would not like to have any further delay on the thing. I will get in touch with Mr. Weaver tomorrow and I will call you and we will see whether or not we can not arrange for a joint effort on this thing.



*Current non-mineral position—relative self-sufficiency (based on actual po*
*implied in colu*

| MATERIAL | UNITED STATES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | STRATEGIC RAW MATERIALS (Agricultural or Animal Origin) | | | | | SUBSTITUTES (Material and/or Substitutes) | | | | |
| | A VIRTUAL SELF-SUFFICIENCY ASSURED INDEFINITELY | B DEPENDENCE ON FOREIGN SOURCES AND REMOTE POSSIBILITY FOR IMPROVEMENT | C DEPENDENCE ON FOREIGN SOURCES AND GOOD POSSIBILITY FOR IMPROVEMENT | D PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH LITTLE HOPE FOR IMPROVEMENT | E PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH GOOD POSSIBILITY FOR IMPROVEMENT | A VIRTUAL SELF-SUFFICIENCY ASSURED INDEFINITELY | B DEPENDENCE ON FOREIGN SOURCES AND REMOTE POSSIBILITY FOR IMPROVEMENT | C DEPENDENCE ON FOREIGN SOURCES AND GOOD POSSIBILITY FOR IMPROVEMENT | D PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH LITTLE HOPE FOR IMPROVEMENT | P E G F |
| **Chemicals:** | | | | | | | | | | |
| Agar | | | | | Agar | | | | | |
| Emetine | | Emetine | | | | | | | | |
| Hyoscine | | | Hyoscine | | | | | | | |
| Opium | | | Opium | | | | | | | |
| Pyrethrum | | | Pyrethrum | | | | | | | |
| Quinine | | Quinine | | | | Quinine | | | | |
| Quinidine | | Quinidine | | | | | Quinidine | | | |
| Shellac | | | Shellac | | | Shellac | | | | |
| **Cordage Fibers:** | | | | | | | | | | |
| Abaca | | Abaca | | | | | | Abaca | | |
| Sisal | | Sisal | | | | | | Sisal | | |
| Henequen | | | Henequen | | | | | Henequen | | |
| Jute | | Jute | | | | | | Jute | | |
| **Forest Products:** | | | | | | | | | | |
| Tannins (Chestnut (Quebracho (Wattle | | | | | Tannin Products | | | Tannin Products | | |
| Cork | | Cork | | | | Cork | | | | |
| Teak | | Teak | | | | Teak | | | | |
| Mahogany | | Mahogany | | | | Mahogany | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mahogany | | Mahogany | | | | Mahogany | | | | |
| Lignum Vitae | | Lignum Vitae | | | | Lignum Vitae | | | | |
| Balsa | | Balsa | | | | Balsa | | | | |
| **Oils:** | | | | | | | | | | |
| Castor | | | | | Castor | | | | | |
| Coconut | | Coconut | | | | | | Coconut | | |
| Palm | | Palm | | | | | | | | |
| Spera | | | Spera | | | | | Spera | | |
| Tung | Tung | | | | | Tung | | | | |
| **Rubber:** | | | Rubber | | | | | | | P |
| **Textiles:** | | | | | | | | | | |
| Cotton, Extra Long Staple | | | | | Cotton, Extra Long Staple | Cotton, Extra Long Staple | | | | |
| Cotton, Upland | Cotton, Upland | | | | | Cotton, Upland | | | | |
| Silk | | Silk | | | | | | | | S |
| Wool | | | Wool | | | | | Wool | | |
| **Miscellaneous:** | | | | | | | | | | |
| Bristles, Hog | | | Bristles, Hog | | | | | Bristles, Hog | | |
| Feathers & Down, Waterfowl | | Feathers & Down, Waterfowl | | | | | | Feathers & Down, Waterfowl | | |
| Pepper | | Pepper | | | | | Pepper | | | |
| Wheat | Wheat | | | | | Wheat | | | | |
| Tobacco | Tobacco | | | | | Tobacco | | | | |

*tion—relative self-sufficiency (based on actual position of each material shown and a combination of the material and/or substitute or potential substitute therefor. Possibility for improvement in degree of self-sufficiency implied in column headings below, would be contingent upon research, expanded production, capital funds, or by other means)*

| SUBSTITUTES (erial and/or Substitutes) | | | WESTERN HEMISPHERE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | STRATEGIC RAW MATERIALS (Agricultural or Animal Origin) | | | | | SUBSTITU (Material and/or | | |
| C DEPENDENCE ON FOREIGN SOURCES AND GOOD POSSIBILITY FOR IMPROVEMENT | D PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH LITTLE HOPE FOR IMPROVEMENT | E PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH GOOD POSSIBILITY FOR IMPROVEMENT | A VIRTUAL SELF-SUFFICIENCY ASSURED INDEFINITELY | B DEPENDENCE ON FOREIGN SOURCES AND REMOTE POSSIBILITY FOR IMPROVEMENT | C DEPENDENCE ON FOREIGN SOURCES AND GOOD POSSIBILITY FOR IMPROVEMENT | D PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH LITTLE HOPE FOR IMPROVEMENT | E PARTIAL DEPENDENCE ON FOREIGN SOURCES WITH GOOD POSSIBILITY FOR IMPROVEMENT | A VIRTUAL SELF-SUFFICIENCY ASSURED INDEFINITELY | B DEPENDENCE ON FOREIGN SOURCES AND REMOTE POSSIBILITY FOR IMPROVEMENT | C DEPENDENCE FOREIGN SOU AND REMO POSSIBILITY IMPROVEM |
| | | Agar | Emetine | | | | Agar | | | |
| | | Emetine | | Hyoscine | | | | | | |
| | | | | | Opium | | | | | |
| | | Pyrethrum | | | Pyrethrum | | | | | |
| | | | | | | Quinine | | | | |
| | | | | | Quinidine | | | | | |
| | | | | | Shellac | | | | | |
| Abaca | | | | | | | Abaca | | | |
| Sisal | | | | | | | Sisal | | | |
| Henequen | | | Henequen | | | | | | | Henequen |
| Jute | | | | Jute | | | | | | Jute |
| Tannin Products | | | | | | Tannin Products | | | | |
| | | | | Cork | | | | | | |
| | | | | Teak | | | | | | |
| | | | Mahogany | | | | | | | |
| | | | Lignum Vitae | | | | | | | |

Coconut

Spera

Bristles, Hog

Feathers & Down, Waterfowl

Wool

Castor

Palm

Rubber

Silk

Balsa

Spera

Tung

Cotton, Upland

Feathers & Down, Waterfowl

Wheat

Castor

Coconut

Palm

Rubber

Silk

Bristles, Hog

Pepper

Cotton, Extra Long Staple

Wool

Tung

Cotton, Extra Long Staple

Cotton, Upland

Wheat

[redacted]

Coconut

Silk

Bristle

Feather

Water

Pepper

*ential substitute therefor. Possibility for improvement in degree of self-sufficiency*
*nds, or by other means)*

| WESTERN HEMISPHERE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S igin) | | SUBSTITUTES (Material and/or Substitutes) | | | | | | | |
| D ARTIAL DEPEND- NCE ON FOREIGN SOURCES WITH ITTLE HOPE FOR IMPROVEMENT | E PARTIAL DEPEND- ENCE ON FOREIGN SOURCES WITH GOOD POSSIBILITY FOR IMPROVEMENT | A VIRTUAL SELF- SUFFICIENCY ASSURED INDEFINITELY | B DEPENDENCE ON FOREIGN SOURCES AND REMOTE POSSIBILITY FOR IMPROVEMENT | C DEPENDENCE ON FOREIGN SOURCES AND REMOTE POSSIBILITY FOR IMPROVEMENT | D PARTIAL DEPEND- ENCE ON FOREIGN SOURCES WITH LITTLE HOPE FOR IMPROVEMENT | E PARTIAL DEPEND- ENCE ON FOREIGN SOURCES WITH GOOD POSSIBILITY FOR IMPROVEMENT | F ACTION REQUIRED IN U.S. OR W.H. TO IMPROVE AVAIL- ABILITY OF MATERIAL OR SUBSTITUTE IN OR TO THE U.S. | G SUBSTITUTE OR POTENTIAL SUB- STITUTE MATERIALS | MATERIALS |
| | | | | | | | | | Chemicals: |
| | Agar | | | | | Agar | Exploration & Recovery Funds | No substitutes | Agar |
| | | | | | | | Further Research | Diodequin, Chloroquin, Aureomycin, Terramycin | Emetine |
| | | | | | | | Research, price guarantee | No substitutes | Hyoscine |
| | | | | | | | Reasons re Geneva conference, extraction plants | No substitutes | Opium |
| | | | | | | | Obtaining seed, price guarantee, plant research, harvesting machinery | Partial: Allethrin | Pyrethrum |
| Quinine | | | | | | | Price guarantees for W. H. production | Atabrine, Chloroquin, Palubrine | Quinine |
| | | | | | | | Price guarantees to W. H. | No substitutes | Quinidine |
| | | | | | | | -- | Synthetic resins from petroleum & agri. sources | Shellac |
| | | | | | | | | | Cordage Fibers: |
| | Abaca | | | | | Abaca | Production research, price guarantees, also same for substitutes | Sansevieria, Phormium, Sisal | Abaca |
| | Sisal | | | | | Sisal | Price guarantees | Sansevieria, Henequen, Am. Hemp, Phormium | Sisal |
| | | | | Henequen | | | Price guarantees | Kenaf, Cotton & Paper are poor substitutes | Henequen |
| | | | | Jute | | | Price guarantees helpful: but more research & price guarantee for Kenaf | Kenaf, Cotton | Jute |
| | | | | | | | | | Forest Products: |
| nnin Products | | | | | Tannin Products | | Further research and production program | Canaigre, Oak, Douglas Fir, Hemlock | Tannins (Chestnut (Quebracho (Wattle |
| | | | | | | Cork | Price guarantees, some research | Fiber glass, Asbestos, Plastics, Rubber, Certain wood barks, Hair Felt | Cork |
| | | | | | | Teak | Further research on substitutes | Other Timber species, possibly plastics | Teak |
| | | | | | | | Higher price, further develop logging operations in W. H. | Other Timber species | Mahogany |
| | | | | | | | Higher price, develop logging operations in | Plastics, metal, phenolic resins | Lignum Vitae |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Higher price, develop logging operations in W.H. | Plastics, metal, phenolic resins | Lignum Vitae |
| | | | | | | Increased logging through price guarantee in W.H. | Glass wool, cellulose acetate, rubber foam | Balsa |
| | | | | | | | | Oils: |
| Castor | | | | | Castor | Further research, price guarantees, expanded production | Tung, modified linseed, soybean, oiticica Potentials: Products from turpentine and animal fats | Castor |
| | | | Coconut | | | Research and price guarantees in W. H. | Inedible animal fats, synthetic detergents In W. H.: babassu oil copuna | Coconut |
| Palm | | | | | Palm | Research and price guarantees in W. H. | Inedible tallow (lard and grease) | Palm |
| | | | | | Sperm | Price guarantees and cost of whaling expeditions | Wild shrub "Simmondsia" in U.S. and W.H. | Sperm |
| | Tung | | | | | -- | Linseed, castor, soybean, fish oils, alkyd resins, ester compounds. In W.H.: linseed, soybean, oiticica | Tung |
| | | | | | Rubber | Research on both natural and synthetic | Synthetics | Rubber: |
| | | | | | | | | Textiles: |
| Cotton, Extra Long Staple | Cotton, Extra Long Staple | | | | | Expanded production | Nylon, rayon | Cotton, Extra Long Staple |
| | Cotton, Upland | | | | | -- | Not required | Cotton, Upland |
| | | | Silk | | | Price guarantees, further research | Acetylated cotton, nylon, rayon acetate | Silk |
| Wool | | | | | Wool | -- | Man-made fibers, re-processed and re-used wool | Wool |
| | | | | | | | | Miscellaneous: |
| | | | Bristles, Hog | | | Research on substitute materials | Nylon, horsehair, Keratin (Exper.) | Bristles, Hog |
| | | | Feathers & Down, Waterfowl | | | Develop mechanical sorters, research on substitutes | Curled chicken feathers, synthetic fibers of acrylic type | Feathers & Down, Waterfowl |
| | | | Pepper | | | Research, capital & price guarantees in W. H. | -- | Pepper |
| | Wheat | | | | | -- | -- | Wheat |
| | [redacted] | | | | | -- | -- | Tobacco |

PREPARED BY COMMODITY STABILIZATION SERVICE IN COOPERATION WITH AGRICULTURAL RESEARCH SERVICE, FOREIGN AGRICULTURAL SERVICE, AND FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.
MARCH 1954

# NON-MINERAL SUPPLIES-1952

| | |
|---|---|
| Bristles | — China, W. Germany, India |
| Castor Oil | — Brazil, India |
| Coconut Oil | — Philippine Islands |
| Cotton (Long Staple) | — Peru, Egypt |
| Feathers | — China, France, Italy, W. Germany |
| Ipecac | — Colombia, Panama, Nicaragua |
| Manila & Abaca | — Philippine Islands, Guatemala, Panama, Honduras |
| Opium | — Iran, Turkey, India |
| Palm Oil | — Philippine Islands |
| Pepper | — India, Indonesia |
| Pyrethrum | — Belgian Congo, British East Africa |
| Quebracho | — Argentine |
| Quinine | — Netherlands, W. Germany |
| Rubber | — British Malaya, Indonesia, Thailand |
| Shellac | — India, Thailand |
| Silk | — Japan |
| Sisal & Henequin | — British East Africa, Haiti, Brazil, Mexico |
| Sperm Oil | — Norway, Panama, Portugal |
| Wool | — United States, Australia, Argentine, New Zealand, Union South Africa, Uruguay |

Minerals, Materials and Fuels Economic Subcommittee
Interior and Insular Affairs Committee, United States Senate

39888 O-54-pt. 9 Face p. 480 No. 2

Mr. RAWLINGS. I think it would certainly speed things up, because frankly, on just these four questions you have asked it takes a lot of time, I mean to get the research people to try to work out estimates, and I know you are pushed for time and we certainly want to cooperate with you. So I think it would help.

Mr. ADLERMAN. I think there is no point in going into detail on any of these other things until we get the figures from Mr. Weaver and yourself.

I would like to get some statement along the lines I have just mentioned, by tabulation, showing the percentages of production, what we can expect from the Western Hemisphere, and the percentage that can be accomplished by substitution in order to make ourselves self-sufficient.

(The tabulation referred to was subsequently furnished and is placed in the record at this point by direction of the chairman.)

I should like to place at this point in the record this map showing the nonmineral supplies for the year 1952.

(The document referred to was marked as an exhibit and is herewith inserted.)

Mr. ADLERMAN. We will adjourn until further notice.

(Whereupon, at 5 p. m., the hearing was adjourned, subject to the call of the Chair.)

TABLE 1.—*Strategic raw materials—Current situation, chemicals*

| Commodity | United States imports | | | World production | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Calendar year | Unit | Quantity | Crop year | Unit | United States | Other Western Hemisphere | Other world | World total |
| Agar | 1952 | 1,000 pounds | 337.2 | | | | | | |
| Emetine (Ipecac) | 1952 | do | 54.6 | 1951 | 1,000 pounds | | [1] 103.6 | | |
| Hyoscine | 1952 | | [2] | | | | | [2] | [2] |
| Pyrethrum | 1953 | 1,000 pounds | 7,739.6 | 1952 | 1 million pounds | | 1 | 16 | 17 |
| Cinchona Bark | 1953 | Pounds | 6,804 | | | | | | |
| Quinine | 1952 | AOZ | 643,912 | | | | | | |
| Quinidine | 1952 | AOZ | 389,751 | | | | | | |
| Opium | 1952 | 1,000 pounds | 998.6 | 1952 | 1,000 pounds | | | 2,352.3 | 2,352.3 |

[1] Brazil only.
[2] Not available.
[3] N. s. c.

Sources: U. S. Department of Agriculture, FAS, Tobacco and Tropical Products Division, Sugar and Tropical Products Branch; U. S. Department of Commerce, Chemicals Division; Office of Defense Mobilization.

TABLE 2.—*Strategic raw materials—Current situation, cordage fibers*

| Commodity | United States imports | | | World production | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Calendar year | Unit | Quantity | Crop year | Unit | United States | Other Western Hemisphere | Other world | World total |
| Abaca | 1952 | 1 million pounds | 151.5 | 1952 | 1 million pounds | | | | |
| Sisal | 1952 | do | 309.3 | 1952 | do | | 34.3 | 261.4 | 295.7 |
| Henequin | 1952 | do | 68.3 | 1952 | do | | 195.8 | 634.4 | 830.2 |
| Jute | 1952 | do | 98.9 | 1953 | do | | 246.2 | [1] | 246.2 |
| Kenaf | 1952 | do | [2] | 1952 | do | | 42.1 | 2,489.6 | 2,531.7 |
| Hemp (American) | 1952 | do | 1.75 | 1952 | do | | [1] | [1] | [1] |
| Sensevieria | 1952 | do | 0.35 | 1952 | do | [1] | 9.0 | 788.5 | 797.5 |
| Phornium | 1952 | do | | 1952 | do | | (0.5) | (0.5) | (1.0) |
| | | | | | do | | [1] | (18.6) | (18.6) |

[1] Negative.
[2] N. s. c.

Source: U. S. Department of Agriculture, FAS, Tobacco and Tropical Products Division, Sugar and Tropical Products Branch.

TABLE 3.—*Strategic raw materials—Current situation, forest products*

| Commodity | United States imports | | | World production | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Calendar year | Unit | Quantity | Crop year | Unit | United States | Other Western Hemisphere | Other world | World total |
| Tannins: | | | | | | | | | |
| Chestnut | 1952 | Short tons | 34,522.8 | 1952 | Short tons | 14,605 | 0 | 96,980 | 111,585 |
| Quelracho | 1952 | do | 138,084.7 | 1952 | do | 0 | 264,796 | 0 | 264,796 |
| Wattle | 1952 | do | 42,553.6 | 1952 | do | 0 | 44,100 | 165,900 | 210,000 |
| Teak | 1952 | 1,000 board-feet | 2,327 | (1) | Cubic meters roundwood | | | 927,000 | 927,000 |
| Mahogany | 1952 | do | 57,881 | (1) | Cubic meters (solid volume) | | 173,627 | 300,705 | 474,332 |
| Lignum Vitae | 1952 | do | 636 | (1) | Cubic meters roundwood | | 4,260 | | 4,260 |
| Balsa | 1952 | do | 10,928 | (1) | Cubic meters lumber | | 37,200 | | 37,200 |
| Shellac | 1952 | Short tons | 6,113.9 | (1 2) | Short tons | | | 61,462 | 61,462 |

1 Approximate annual.
2 Lac (expressed as sticklac).

Sources: U. S. Department of Agriculture, FAS, Tobacco and Tropical Products Division, Sugar and Tropical Products Branch; U. S. Department of Agriculture, Forest Service, Division of Forest Economics; U. S. Department of Commerce, Leather, Shoes, and Allied Products Division.

TABLE 4.—*Strategic raw materials—Current situation, oils*

| Commodity | United States imports | | | World production | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Calendar year | Unit | Quantity | Crop year | Unit | United States | Other Western Hemisphere | Other world | World total |
| Castor | 1953 | Short tons | 63,568.9 | 1953 | Short tons | 12,600 | 95,633 | 137,467 | 245,700 |
| Copra and coconut | 1953 | do | 68,817.8 | 1953 | do | | 8,000 | 1,088,161 | 1,096,161 |
| Palm | 1953 | do | 17,846.0 | 1953 | do | | 1,000 | 1,266,500 | 1,267,500 |
| Sperm | 1953 | 1,000 gallons | 4,630.2 | 1953 | do | | 6,000 | 44,000 | 50,000 |
| Tung | 1953 | Short tons | 11,742.6 | 1953 | do | | | 144,250 | 144,250 |

Sources: U. S. Department of Agriculture, FAS, Tobacco and Tropical Products Division, Sugar and Tropical Products Branch; U. S. Department of Agriculture, FAS, Fats and Oils Division, Commodity Analysis Branch.

TABLE 5.—*Strategic raw materials—Current situation, textiles*

| Commodity | United States imports | | | World production | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Calendar year | Unit | Quantity | Crop year | Unit | United States | Other Western Hemisphere | Other world | World total |
| Cotton: | | | | | | | | | |
| Extra long | 1953 | 1,000,000 pounds | 56.9 | 1953–54 | 1,000 bales | 67 | 78 | 702 | 847 |
| Short (upland) | 1953 | do | 33.5 | 1953–54 | do | 16,370 | 3,698 | 15,855 | 35,923 |
| Silk: | | | | | | | | | |
| Green cocoons | 1952 | 1,000 pounds | 12 | 1952 | 1,000 pounds | (1) | 1,000 | 381,100 | 382,100 |
| Raw silk | 1952 | do | 7,600 | 1952 | do | (1) | 100 | 46,700 | 46,800 |
| Wool | 1953 | 1,000,000 pounds | 573.0 | 1953 | Million pounds; grease basis | 271 | 769 | 3,376 | 4,416 |

[1] Negative.

Sources: U. S. Department of Agriculture, FAS, Tobacco and Tropical Products Division, Sugar and Tropical Products Branch; U. S. Department of Agriculture, FAS, Livestock and Wool Division, Commodity Analysis Branch; U. S. Department of Agriculture, FAS, Cotton Division, Commodity Analysis Branch.

TABLE 6.—*Strategic raw materials—Current situation, miscellaneous products*

| Commodity | United States imports | | | World production | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Calendar year | Unit | Quantity | Crop year | Unit | United States | Other Western Hemisphere | Other world | World total |
| Bristles, hog | 1952 | 1,000,000 pounds | 5.4 | (1) | 1,000,000 pounds | (2) | (2) | (3 7–10) | (3 7–10) |
| Feathers and down | 1952 | do | 11.0 | 1953 | do | (25) | (2) | (45–50) | (70–75) |
| Wheat | 1953 | 1,000,000 bushels | 5.3 | 1953 | 1,000,000 bushels | 1,168.5 | 963.5 | 5,018.0 | 7,150.0 |
| Pepper | 1953 | 1,000,000 pounds | 30.5 | 1952 | 1,000,000 pounds | 0 | 1.4 | 76.0 | 77.6 |
| Tobacco, leaf | 1953 | do | 93.7 | 1953 | do | 2,080.7 | 896.3 | 4,346.9 | 7,323.9 |

[1] Approximate annual.
[2] Negative.
[3] China produces about 90 percent of the world total.

Sources: U. S. Department of Agriculture, FAS, Tobacco and Tropical Products Division; U. S. Department of Agriculture, FAS, Livestock and Wool Division, Commodity Analysis Branch; U. S. Department of Agriculture, FAS, Grain Division, Commodity Analysis Branch.

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